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ORIGINAL ARTICLES

AN EASILY ADJUSTABLE LINGUAL LOCK FOR USE WITH REMOVABLE LINGUAL ARCHES

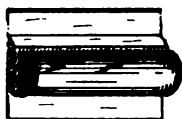
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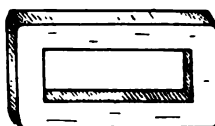
SINCE the publication of the August issue of this JOURNAL in which an article under the above heading was published, I have had so many inquiries by letter in regard to the making of this lock, that it has seemed advisable to give a little further description of the device together with illustrations.

This lock is made of two parts:

1. Lug soldered to a backing.
2. Rectangular tube to fit lug.



LUG SOLDERED TO BACKING
READY FOR SOLDERING TO BAND



TUBE TO FIT LUG



LUG AND TUBE - ASSEMBLED

Fig. 1.

A 24- or 25-gauge spring wire is used to lock the tube on the lug. For ordinary movements I use 25-gauge spring wire as it is easier to remove, but, if the movement is a lingual movement or a rotation of the molars, I use

24-gauge as it fits the groove very accurately and makes the appliance very stable bucco-lingually. With the 25-gauge wire it is stable occluso-lingually, which is the ordinary stability desired.

Fig. 1 shows the lug and tube as now made by the Blue Island Specialty Co., of Blue Island, Ill. The back is attached to the lug to facilitate soldering, thus eliminating, to a large extent, the danger of solder flowing onto the lug and preventing the tube from sliding into place.



Fig. 2.



Fig. 3.



Fig. 4.

The lug should first be soldered to the band with 18 karat solder in the position desired on the molars. It is best here to flow a little solder on the band first and after heating this up hold the lug in position with a pair of tweezers to solder. Thus the lug is heated but little and the solder is not liable to flow over the lug, neither will the backing be burned.

The groove on the lug is to fit the 24- or 25-gauge wire for locking the tube to the lug.

It is well now to polish the lug on the band before attempting to make the rest of the appliance, as it greatly increases the ease of placing and remov-



Fig. 5.



Fig. 6.

ing the tubes from the lugs in the construction and adjustment of the appliance.

The lingual arch or base wire is next shaped as desired and the tubes soldered to it. Then place the tubes over the lugs with the arch in place and heat to a cherry red to make the arch perfectly passive and leave no strain on the molars. Complete technic for this was given in the August issue. This arch may also be made in three pieces if desired and then soldered together, rather than shaping one base wire.

Fig. 2 shows the lug soldered to the band and also plainly shows the groove in which the locking wire fits to hold the tube tight to the lug.

Fig. 3 illustrates the tube soldered to the arch ready for placement over the lugs on the bands, and Fig. 4 shows the arch, tube and lug assembled.

The locking wire will here be noticed in place in the groove in the lug. I now make this spring longer than was shown in the previous description, as I find it works much better in placing and removing from the mouth. This spring wire is soldered gingivally to the arch and about half an inch forward to the lug. It is then carried back, up and over the lug to fall into the groove. This gives a long elastic spring which is very easily manipulated.

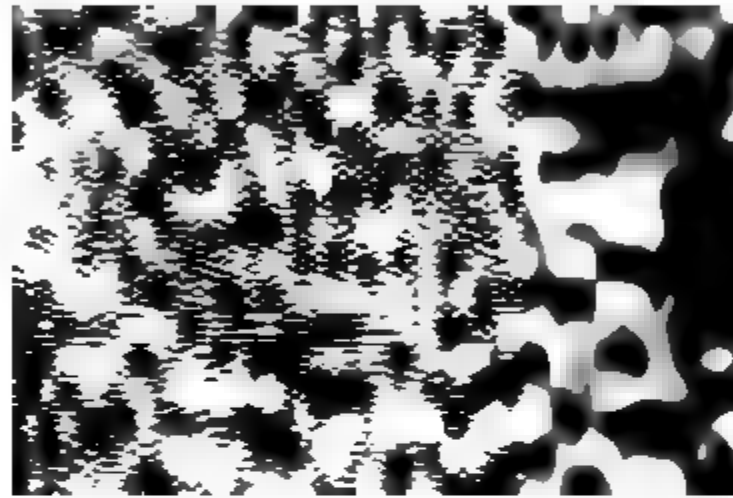


Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 5 shows a lower lingual appliance from a side view with the lock in position and Fig. 6 shows the occlusal view of the same. The base wire is of 18-gauge and serves as a molar stabilizer and also gives attachment for springs, etc.

The ease of adjustment, ease of placing and removing from the mouth together with the stability gained has amply given satisfaction and pleasure in the use of this lock.

Figs. 7 and 8 illustrate other appliances used with this lock in position.

Fig. 9 illustrates the use of this lock in a case of unilateral expansion. The molar and two premolars on the left side are to be moved buccally without

moving the teeth on the right side. Therefore a round tube has been used on the left molar band (Fig. 10) which allows tipping of this tooth but on the right side the lock described above is used (Fig. 11) which gives stationary anchorage and this, being also reinforced by the five adjacent teeth, practically insures sufficient resistance to move the three teeth on the opposite side of the arch. In using the round tube in conjunction with this lock the lingual appliance must be placed in the round tube first and that side carried fully to position and then the square tube will slip over the lug with no difficulty.

Fig. 11.

Emphasis must be placed on the fact that the bands should accurately fit the teeth and have a good impression taken with the bands on the teeth and a model made with the bands thus in place before the appliance is constructed. Then cement the appliance in place as a retainer with both bands attached to the lingual appliance. Be sure the bands are cemented on the teeth as they were when fitted. This is *very important*. Otherwise the molar teeth will be moved and will become sore at first.

If the correct technic is used I believe this lock will prove most satisfactory to any one using lingual appliances, as stability and ease of placing and removing are most certainly gained.

ORTHODONTIA AND ITS RELATION TO MODERN TENDENCIES OF DENTAL AND MEDICAL PRACTICE*

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TO QUOTE from a recent letter received from the chairman of your program committee in which he very kindly asked me to appear before your society, he said in part, "It is the intention of our medical society to tender a banquet to the dentists of the city, and it is my impression that the subject of orthodontia will fit in very nicely and no doubt be of mutual interest to both the medical and dental professions, it being a subject that will serve as a missing link, also a topic which has not been given very much consideration in the past, in medical discussions."

It seems, however, that if we were searching about this evening for a subject that would serve as a "missing link" between the medical and dental professions we would be obliged to adhere rather closely to that paramount issue and the issue that is still being much contended, namely, "focal infection as related to the teeth and oral tissues."

Inasmuch as the subject of the "missing link" has been suggested, also for the reason that it is a very live and timely topic, and as a means of leading up to our subject, it is significant, at this time to all of us.

It is gratifying to note that some of the foremost medical men and dentists are calling a recess at least on the almost panicky extraction of teeth, and are adopting more the attitude of "stop, look and listen." The best of opinion seems to be still at greatly divergent points of focus upon the question of the extraction of teeth, for the purpose of removing infectious areas, that is, as to when they should and when they should not be extracted.

There seems to be no dispute, however, but that too much reliance has been placed upon the x-ray film and its interpretation as a final diagnosis. We are now beginning to realize that the x-ray is an aid or adjunct to diagnosis as are clinical manifestations; nevertheless, it must be conceded that the x-ray is one of the most important aids to diagnosis with which we are supplied.

The present day attitude of many of our physicians upon this subject seems to be about as follows: if there is the slightest possibility that infectious areas in and about the roots of the teeth of our patient may be responsible for some of his diagnostic symptoms and complaints, in other words if there is a remote possibility that the condition of his teeth and oral tissue might be a predisposing factor in bringing about the symptoms, let us extract the tooth or teeth, because after all a tooth is rather a minor consideration whether out of the mouth or in the mouth, when compared with the general physical condition of the patient. After the teeth have been extracted then we will be able to rest assured that all doubt has been removed, and we shall also be able to ascertain

*Read before the Decatur Medical Society, Decatur, Ill., Nov. 23, 1920.

the results which may follow. We might sum up the attitude of many physicians in a few words: "When in doubt, extract."

On the other hand, there is rapidly waxing a sentiment among the dental profession after having observed the extraction of not only many diseased teeth during the past few years, but also having witnessed the extraction of many perfectly normal teeth, as well as many only slightly affected, about as follows:

"Why condemn teeth to the forceps until it has been at least reasonably revealed that these structures are pathologically beyond possible repair?" To say the least, a most excellent and logical reason should be shown why the teeth should be removed before they are forever lost. The evidence of the x-ray alone is not sufficient to declare the root ends of teeth pathologically unfit for further service.

Inasmuch as many of my audience are medical men, and as this subject seems to be called to the bar of justice by many of the best minds in the medical and dental professions at this time, then with your indulgence I shall quote a few excerpts from an editorial which appeared in the *Journal of the National Dental Association*, March, 1920, and is excellent evidence of the trend of thought at least in the dental profession at this time:

"Medicine has helped us—quick to accept the findings of the leaders in bacteriologic and pathologic research, the great parent profession was quick to put the findings into effect with the result that daily patients were sent to the radiographer and thence to the dentist with orders for extraction. It was a good beginning, the beginning was started where it was the easiest and the patient was duly impressed with the intelligence of the physician. There was no palliative consideration of the teeth, for what is a mere tooth, and the dentist in his desire to be no whit behind the physician, extracted. In this combination the dentist was to blame. He is supposed to know something about teeth, while the physician knows nothing about them.

"Another collaborator in the slaughter was the elusive shadow with its enigmatic suggestion of ill aided and abetted edentulousness. For a long enough period the film and forceps might have been the dental coat of arms. And who would hang his honor to a film today. But the skiagram is the last word in science, and we are scientists so—*exeunt*. Often the radiographer returned a diagnosis with the film until dental pride grew tender, and then with ethical religiosity he suggested 'diagnosis upon request.' Frequently the radiographer was not a dentist.

"All the while there have been conservatives who urged that we were too free to extract. There are men in our profession whose words are always 'apples of gold' if we would only listen to them. Thumbing our literature, it is easy enough to find them, words of council, words of fear—fear of the far swing of the pendulum. In their long experiences they have seen great enthusiasms sweep over the profession before, only to leave a wake of shattered hopes, and a clientele rich in resentment. They foresaw this day too, and urged wisdom and discretion, only to be regarded too often as old fashioned and behind the times. Also these men do not run to print, as do so many whose flow of new thought effects a screen for hiding previous ignorance."

In April, 1920, the Missouri State Dental Association unanimously passed resolutions commending the attitude and position taken by the editor of the *Journal of the National Dental Association*, in the above editorial, and directed the secretary to forward to him, a copy of such resolutions. To those who are following the trend and culmination of opinion in the dental profession, it is quite obvious that the hand of caution is now being raised against the too prevalent mutilation of mouths and the mastication function in the mouths of our patients.

We are not unaware, neither do we lose track of the actuality, that some of the physical benefits derived in individual and outstanding cases by the removal of diseased teeth have been nothing short of phenomenal. These almost astounding results, however, we have heard a great deal about in the literature of both professions, and, not unlike the phenomenal pecuniary benefits enjoyed by the location of an oil gusher in Texas, which have benefited a few fortunate individuals have been in turn responsible for the loss of millions of dollars expended in dry holes by the many less fortunate ones, so have these remarkable cases been responsible for the mutilation of many mouths without beneficial physical improvement following.

It is to be hoped, however, that the extraction panic of the last few years will go down in medical and dental history as the beginning of a new epoch in the relation of the two professions, that it will also again prove the old epigram that "It is an ill wind that blows no good," and the ultimate results of these past measures will develop in the dental profession, not only the desire to advance scientific methods of practice to such an extent that we may be able to save teeth rather than remove their functions entirely, but to stimulate in us, the modern idea and development of preventive dentistry.

There are some branches of dentistry in which we have evolved a very keen appreciation of the whole masticating apparatus as a unit. A full complement of teeth and each tooth in its normal position in the dental arch is the ideal of this specialty, and it is a rather interesting study and science, when well understood.

It shall be my purpose then, by means of the accompanying illustrations, to show you nothing particularly new or that which has not been known for a number of years, but to picture to you the angle or perspective of the dental mechanism from the standpoint of an orthodontist, and it will also be my particular effort to point out that the dental architecture of man, means a great deal more to his physical development, well being, and general health than is generally known. If my remarks at times appear a trifle elementary to my dental friends, it is to be remembered that we assume the medical men are as unacquainted with some departments of our work as we dental men may be with the various specialties of medicine.

In the subject of orthodontia we fortunately are not required to deal, to a great extent, with the question of the extraction of teeth, for we are concerned more directly with the correction of an abnormal dental apparatus which we call malocclusion of the teeth.

In this department of dentistry we are, one might say, almost perverse on the question of retaining the natural teeth in the mouth, and in as good condi-

tion as is possible. While we are fully and alertly cognizant of the almost endless chain of difficulties which may arise in the general physical condition directly from a diseased tooth, we do not take the extraction of a tooth in the dental arch lightly, for reasons which I shall presently endeavor to point out in detail.

For your information, then, some of our authorities upon this subject have defined orthodontia in short, and to the point, as the science that has for its object the correction of malocclusion of the teeth. Malocclusion is a deviation from the normal to such an extent as to interfere with the functions of the

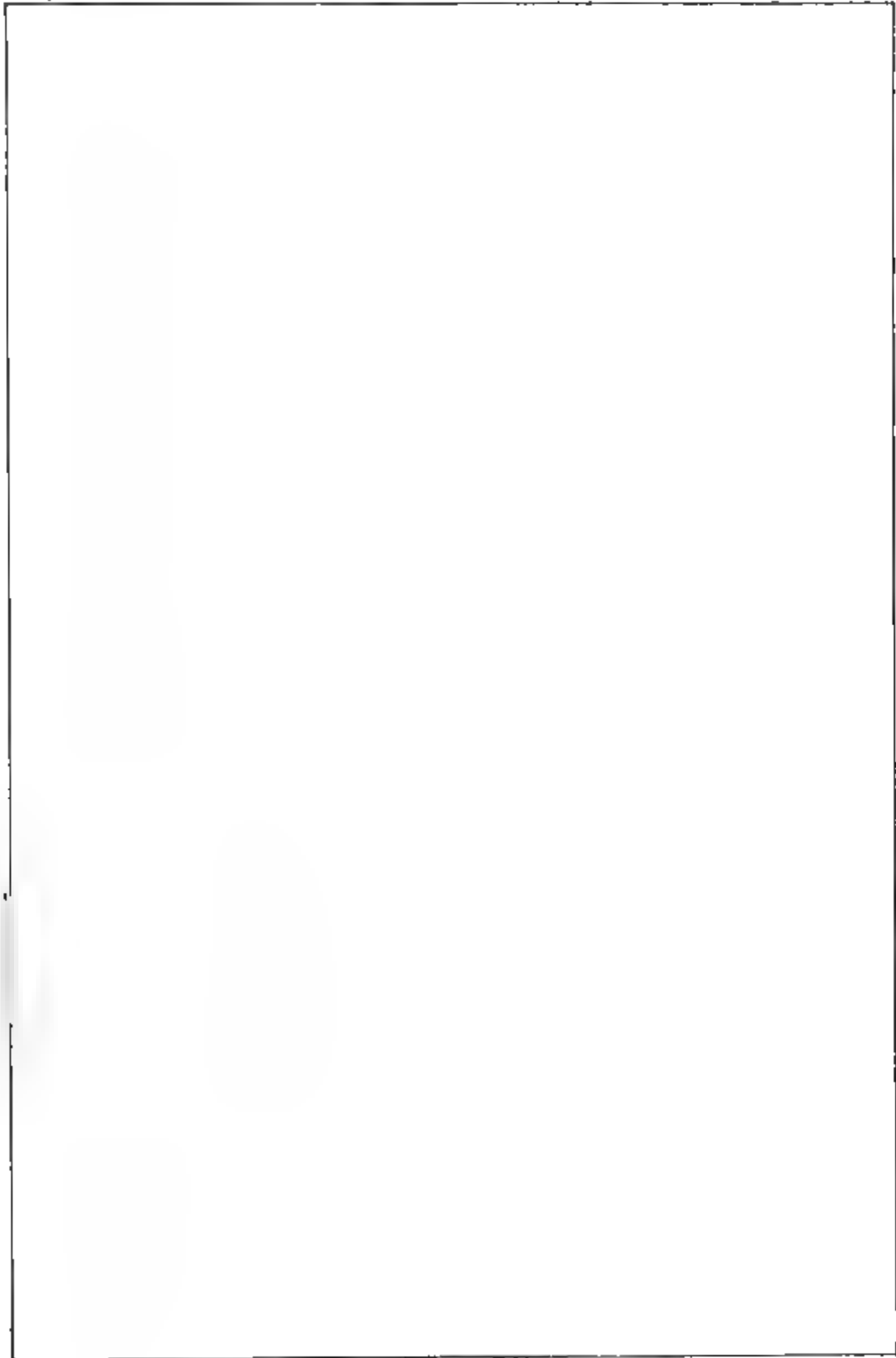


Fig 1.—Normal occlusion (Aztec skull). (Ketcham.)

teeth. Normal occlusion is the normal relation of the inclined planes of the teeth, and so on. To show the normal anatomy of occlusion of the teeth and its relation to the lower third of the face, attention is called to Fig. 1 which represents the mechanisms of nature intended for a thorough masticating machine. Each tooth in the maxillary arch has an exact position which it occupies in relation to each tooth in the mandibular arch. In this illustration each tooth has its proper position to occupy, and if it were any other place, the dentition would be what we call a malocclusion. If you are able to call upon your imagination and picture the apparatus shown in actual operation, the lower jaw opening and closing on its hinge, namely, the temporomandibular articulation, and constantly and systematically hammering away upon the upper jaw in its rhythmic excursion in the mastication of food, exerting hundreds of pounds of pressure, you will then have a mental picture of one of the tremendous forces which act as a powerful influence in developing this lower portion of the face, and maxillary structures.

Not only do we find this force along with many others, a most effective governing influence upon the development and formation of the dental mechanism, but equally is it distributed over many other areas of the skull. Particularly are certain forces of occlusion involved in the ultimate formation of the maxillary sinuses, as well as the sphenoidal, frontal, and all other sinuses. The nasal fossa and its development both in size and form is unavoidably interlocked with the development of the oral cavity and dental arches.

Medical men present are perfectly familiar with the not uncommon deflected nasal septum which is so closely interlocked and often influenced by the size and architecture of the hard palate. These great forces which influence the development of the osseous formation of the lower third of the face and skull have no small bearing upon the nasal septum and turbinate bones, as has been conclusively demonstrated by Cryer, G. V. I. Brown, Angle, Ketcham, Dewey, Noyes, and many other writers and investigators.

There are other forces involved, of course, in this development, a combination of mechanical forces known as the forces of occlusion with which I shall attempt to make you familiar by means of the following illustrations, a most minute understanding of which is necessary to the orthodontist, as these various forces are really the skeleton of his whole work.

1. Forces of the inclined planes of the teeth.
2. Muscular, tongue and lips, cheeks, etc.
3. Atmospheric pressure.
4. Normal cell metabolism.
5. Normal proximal contact.
6. Harmony in the size of the arches.

An infinite amount of investigation has been done by Angle upon the mechanism or occlusion of the teeth. He has shown how the forces of occlusion are directly concerned in the normal development of the face. The normal locking of the cusps of the upper teeth with those of the lower dental arch, form and mold the arch shape of the jaws by their tritulating and grinding movements one with the other.

Probably the best work we have upon this particular phase of orthodontia

is Cryer's *Internal Anatomy of the Face* in which he points out many anatomic variations and many of them directly linked with the formation of the dental apparatus. In his conclusions he says, "It is, of course, to be understood that the factor behind these anatomic variations leading to assymetrical development is necessarily nutritional that the most important etiologic factor in the irregularity of the upper dentures of mouth breathers is the loss of the developing and molding influence which directly result from the percussive force of occlusion exerted by the mandible upon the maxillary arch." That the presence of adenoid growths in the nasopharynx or in fact any cause which interferes with the normal closing of the mouth, at once interferes with occlusion which he regards as the most patent factor in the normal development of the relation of the upper to the lower denture. Mouth breathers also lose very largely the effect of the pressure which is exerted laterally in normal mouths by the tongue.

The extraction of the permanent teeth of the child not only mutilates the dental apparatus within itself beyond repair, but in addition to this to a greater or less degree throws this developmental scheme of Nature out of plumb. The extraction of several teeth, may disturb the developmental forces to such an extent as to cause deviations of the nasal septum, and assymetrical development of the entire maxillary structures. The extraction of the first permanent molar tooth of a child is about the greatest crime which may be committed upon the dental equipment of a child.

It is a well-known fact, but not usually given much consideration, that the alveolar processes are a temporary structure which are literally grown and formed (using the maxillæ as a base of supplies) for the purpose of being a supporting structure for the teeth. It is highly cancellous, varies in every individual, and is constantly in a state of transition as the teeth develop, or are lost. It disappears entirely with the loss of all of the teeth, and its entire disappearance has an effect upon the antra, the septum, and upon the mandible. The antral floors rise to a level with the nasal floor, and it is contended there is a marked bowing in the vertical axis of the septum with the shortening of the hard palate which is always present after the loss of the teeth. It is also pointed out that each bone in the skull should bear a definite relationship to each other, as to size, then it follows, that any one or two of these bones which shall fail to attain their full size, must necessarily affect the size of all bones articulating with them. Deficient development, then, of the alveolar processes, no matter what the cause, affects that of the whole face, and especially that of the nasal spaces.

By the extraction of one, two, or many teeth, just in proportion is the structure and osseous formation wrecked in both its function and purpose in the individual. The masticating function, which is such a tremendous influence in the development of these parts, appears as the teeth appear, in life and vice versa, the masticating function disappears as the teeth are removed, unless they are replaced by some artificial substitute.

In a series of experiments conducted upon rabbits, Lawrence Baker has shown by destroying the masticating function entirely on one side of the mouth of rabbits, the bones and sinuses of this side of the face and skull develop only

slightly compared to the development and growth of the side in which the masticating function has been allowed to remain intact.

The lack of growth in the osseous structure of the rabbits on the affected side not only manifested itself in the maxillary region, but extended entirely up to and including the zygoma and parietal regions.

A number of years ago it was not at all uncommon to extract teeth for the purpose of correcting irregularities or so-called crooked teeth. This is now not even considered for the reasons which I have tried to point out to you. We know that when we extract teeth we not only lose a good tooth which was placed there for a very good purpose, but in addition to this, we then and there start a shifting of teeth, not unlike the shifting sands of the seashore which in time

Fig. 2—Shape and relation of nasal cavity and roof of mouth at birth. Note absence of maxillary sinus.

completely wrecks the masticating apparatus from a standpoint of balance and efficiency.

Every dentist of wide experience and who has observed the results of tooth extraction over a period of years is cognizant of the fact that the most direct and unobstructed route to old age is the complete extraction of one's teeth, insofar as appearance may be concerned, at least.

In Fig. 2 we have the shape and relation of the nasal fossæ and roof of the mouth at birth. There are no maxillary sinuses at this period, and it is not at all difficult to imagine the tremendous influence which must be exerted upon these forming sinuses, cavities and bones by the mastication of food, as well as by all of the other forces of occlusion.

It seems to be quite generally accepted that mouth breathing as a result

of enlarged lymphoid tissue is the most outstanding single cause of irregularities of the teeth; then to correct these conditions, it is reasonable to suppose that all conditions which predispose to mouth breathing should be removed at the earliest possible moment in order to discourage this habit to the fullest extent. (Fig. 3.)

We are aware that there are many other causes of malocclusion, however, including, of course, all of the general nutritional disturbances in the growing child, childish habits, such as thumb-sucking, lip habits, biting of the tongue, etc., *ad infinitum*.

Malnutrition, from whatever cause, is obviously one of the outstanding etiologic factors of malocclusion. Malnutrition may be the result of any one of the many systemic disorders to which children are heir, which may, in turn, manifest itself in the development of the osseous and dental structures. On the question of heredity, we can only draw our own conclusions, and be sure of nothing; however, the question of heredity must be reckoned with in our work the same as is done in the treatment of all physical defects.

Fig. 3.—Showing abnormal muscular lip pressure associated with mouth-breathing. Illustrates also almost entire loss of musculature of the lip, as a result of disuse.

The medical man and the dentist of today should at least be sufficiently informed upon these innocent vices of childhood to be able to recognize some of the simpler etiologic factors in the development of these deformities and be able to advise parents intelligently when casual observation will reveal the development of abnormal conditions in their incipency and many times as the result of some simple childish habit.

It has not only been my own observation, but that of many orthodontists, that the apparently innocent childish habit of thumb sucking causes many malocclusions that remain a permanent deformity throughout life of an individual. This habit may be broken in infancy with the proper precautions, however, and the habit should be discouraged whenever possible. We find that even at the present time not a few physicians are advising parents to allow their babies to suck their thumbs, maintaining as an argument that it is an instinctive impulse and will serve as a pacifier for the child. It is true that many infants persist in

this habit over a long period of time with no apparent permanent injury having developed, however, it is obvious we have just enough of them who do develop malformations as a result of this habit that the habit should be vigorously discouraged by medical men and dentists, collectively, and at all times when the opportunity presents.

Fig. 4 — Typical malocclusion as a result of sucking the thumb, the upper front teeth erupting far in advance of the lower ones. The thumb being in the mouth constantly, prevents normal growth development in many instances.

Fig. 5 — Narrow and constricted upper dental arch with inclining upper front teeth, being exaggerated as a result of a habit of constantly biting the lower lip.

Fig. 4 illustrates a typical malocclusion as a result of an unruly thumb habit extending over a period of years. Many young persons even at the ages as advanced as sixteen who persist in this habit as a result develop an orifice in the front of the dental arch when the teeth are in occlusion which exactly as-

sumes the shape of the thumb. Patients who persist in this habit up to advanced adolescence, many times indulge in it, then only at night time, when asleep and are unconscious of the habit during the daylight hours.

Another habit, that of biting the lip (Fig. 5) if indulged in persistently usually results in protruding front teeth, in conjunction with receding lower dental arch, as a result of the constant pressure of the elastic lip being exerted,

Fig. 6.—Crowded and irregular teeth Insufficient bone area to accommodate all of the teeth in proper position.

Fig. 7.—Deficient development of mandible with all of lower teeth, and dental arch in distal occlusion to upper (a) in child of four years; (b) same case at five and one-half years.

as in influence during the formation period pressing against the upper front teeth and forcing them outward. After the damage is wrought it usually persists throughout a lifetime unless it is corrected, as the space between the upper and lower teeth has been constructed and designed so to speak, just exactly to conveniently accommodate the lip. Note in Fig. 5 the pointed and narrow upper arch and teeth which is typical of these cases.

Certain forms and types of nursing bottles for infants are known also to

be injurious to the mouths. Pacifiers are open for criticism; however, it is a question sometimes as to whether or not this criticism is always justified inasmuch as these pacifiers lack the weight of that of a bottle or the weight of an arm, to bear pressure on the chin and cartilaginous palate at this critical period of growth.

We find probably one of the most dangerous periods for the cultivation of these habits is the transitional period at which time a child is losing his deciduous teeth and erupting his permanent ones, inasmuch as no small amount of damage may be done at this time to the growing structures. At this stage of development the dental arches are in their transitional and formative period and any abnormal influence seems to be most effective in designing the formations of osseous structure which are to follow later.

Fig. 8—Caused probably by allowing deciduous teeth to remain in position too long, the roots of the deciduous teeth not having absorbed normally. Insufficient growth of the alveolar processes to accommodate all of the teeth in proper position.

By a series of slides which are to follow, I will attempt to point out the close relationship which exists between a normal dental apparatus, and the remaining internal and external structures of the face and skull.

In Fig. 6 we have a condition which is not at all uncommon. Crowded and irregular teeth, which are always associated with underdeveloped maxillary osseous structure, the maxillaries being too small in size and bulk to conveniently accommodate all of the teeth in their proper position. The teeth then get into their positions as best they are able to, a sort of "catch as catch can" and "survival of the fittest" excursion.

This type of malocclusion is many times associated with respiratory difficulties, and the orthodontist feels it of prime importance to insist that the phar-

Fig. 9.—Narrow and constricted development of upper dental arch allowing teeth to become locked within the lower dental arch. This condition may be largely prevented in many cases by proper dental treatment.

Fig. 10.—(a) Narrow constricted dental arches, history of adenoids and tonsils, typical mouth breather.
(b) After upper and lower dental arches have been expanded.

ynx be entirely clear of enlarged lymphoid tissue, before being justified in going ahead with correction. In order to correct this condition, we do not attempt to simply straighten the teeth as is generally supposed, however, we do by means of the teeth cause the bones to enlarge and develop, which will then very easily allow all of the teeth to assume their correct positions, and occlusions, accordingly, when the bone has been developed sufficiently to accommodate all of the teeth.

Very young children many times develop a marked malocclusion very early in life. (Fig. 7, child age four, left) we are unable to know positively what caused a condition of this kind, however, we do find them quite frequently associated with mouth breathing, as well as thumb sucking. The possibilities

Fig. 11.—(a) Upper dental arch in lingual occlusion with the lower, locking the upper, preventing its proper growth and development. (b) After proper occlusion has been established, by shifting the relation of the dental arches.

for improvement are very great, by proper treatment, however, many thousands of these cases remain throughout life without treatment.

The retention of the baby or deciduous teeth for too long a period after their roots should have been absorbed by nature, causes many cases of malocclusion. The permanent tooth erupting in its crypt at times fails to absorb the root of the deciduous tooth which in turn then mechanically causes the permanent teeth to find their places in the dental arch in their improper positions, or in malocclusion.

In Fig. 8 we see a typical case of this type which, no doubt, has been influenced at least by the too long retention of the deciduous teeth in the mouth. Fig. 9, another type of typical malocclusion, the lower mandible teeth occluding in advance of the upper maxillary teeth. In order to correct a condition of this

kind it becomes necessary to shift the entire occlusion of the mandibular and maxillary arches, and anything short of this means failure in the end, crowded and irregular teeth in both arches, there not being sufficient bulk of the maxillary bones to accommodate all of the teeth.

Fig. 10. History of adenoids and enlarged tonsils. Very narrow and constricted maxillary arch with high vault, and deviated nasal septum. Distal occlusion of the lower teeth, typical mouth breather. This type of malocclusion is quite common and appears very early, being particularly noticeable about

Fig. 12.—Malocclusion having been caused by the early childhood extraction of the permanent molar teeth. Case is also complicated by a persistent lip habit, crowding the upper teeth outward and the lower teeth backward. Lower teeth occlude on the soft tissues of the palate

the period of the eruption of the central incisor teeth. Previous to this time, however, these cases are easily manifest to the experienced eye, and usually respond to treatment rapidly. The forces of occlusion having been perverted to a marked degree, the entire structure has developed in an abnormal direction.

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SOME RECENT ADVANCES IN ORAL PATHOLOGY*

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INTRODUCTORY

THE subject announced as the title of this paper is of such great importance and covers so wide an area that it is impossible to do anything like adequate justice to it in the time at the disposal of the writer. It will be well, therefore, to consider it from the dental viewpoint only, and to restrict even that to some matters which, having come immediately under the notice and investigation of the speaker, should be of interest to his present audience, who deal so largely with the dental requirements of children, the main idea being the stimulation of thought and the encouragement of further and more serious work in the investigation of dental and oral pathology. For it is a lamentable fact that toilers in this field are few and far between, and the surface of the ground is only beginning to be scratched and dug into. Attention may be directed, therefore, to a few remarks on dental caries, "pyorrhea alveolaris," and diseases of the dental pulp.

DENTAL CARIES

Of all branches of dental pathology the study of dental caries is supreme in everyday work. So universal are its manifestations, so widespread and devastating its effects, that it is a question of curious interest that investigations as to its origin and nature have but seldom during the last few years been undertaken. It is assumed that the doctrines of Miller,¹ Leon Williams,² Goadby,³ Black,⁴ Walkhoff,⁵ Pickerrill,⁶ and other authorities hold good and, in some quarters, the opinion is expressed that there is no necessity for further prosecution of its etiology. This is a nonprogressive and unscientific attitude of mind, for bacteriology—a comparatively new science and of high importance in this connection—has done, and is doing, much in the way of advancement.

MOST RECENT THEORY REGARDING ITS CAUSATION

Among the latest writers on the causation of dental caries is Eckermann,⁷ who, from the viewpoint of the physicist and chemist, rather than that of the clinician, now attempts to shatter the lactic acid theory of Miller. He contends, briefly, that this condition is not caused by lactic acid but by osmosis. Regarding the dentine as a semipermeable membrane, he maintains that it acts chiefly at the gingival margins of the teeth—where bone atrophy has occurred—as an osmotic membrane. Regarding also human enamel as defective in structure, he declares that osmosis takes place even in this tissue.

The process, as he conceives it, would appear to be as follows. In conse-

*Read before the Meeting of the American Society of Orthodontia, Chicago, Ill., April 5-7, 1920.

quence of the large amount of salt and sugar consumed by civilized peoples, the saliva becomes loaded with dissolved material of a greater specific gravity than the lymph in the dental pulp. Osmosis occurring at the weak spots in dentine and enamel already mentioned, it follows that the lymph is forced into the dentine and ultimately into the enamel, forming colored tracts which, on becoming infected by microorganisms, he calls "caries canals."

This astonishing, wholly irrational, fantastic and incorrect theory is the latest. Reference to it is only here given to demonstrate that a question like the causation of dental caries can be used at times as an opportunity for the display of colossal ignorance on the part of incompetent observers for the exploitation of certain ends. It can really only be settled satisfactorily by the concerted action of dental surgeon, histologist, biologist, chemist, physiologist and pathologist—and common sense. The concept has probably arisen from the erroneous interpretation placed upon the histologic appearances of dentine and enamel following the injection at high pressure of stains and dyes by means of a hypodermic syringe in the pulp canal, as advocated and practiced by von Beust. Thus recent advances become retrogressive and therefore harmful.

The results of the above are highly unsatisfactory and entirely misleading. The etiology of dental caries is not yet thoroughly known; its problems by no means solved. In this connection a resolution passed by the Third International Dental Congress in Paris may be recalled: "Our present knowledge of dental caries cannot explain the different forms of this malady." After study of the question, extending over many years, the speaker has come to the following conclusions:

The only certain things known about it are its signs, its complications, its external origin, its contemporaneousness with early life. That it is a molecular disintegration of the hard tissues, beginning in decalcification of inorganic constituents and ending in the dissolution of their organic parts, is generally believed; but its causes are unknown and even which teeth are most seldom or most frequently the object of its attack.

With regard to the relative dental susceptibility G. V. Black probably got nearer the truth than any other authority.

The accompanying charts show the percentages of dental caries occurring (Chart I) in twelve thousand extractions (Magitot); (Chart II) in thirty thousand extractions (Pare and Wallis); (Chart III) in private practice, records of occurrence during adolescence (G. V. Black); and (Chart IV) in dental hospital practice, all ages, (Lewis and Hopewell-Smith). The side numerals indicate the percentages. The letters with their numerals indicate maxillary teeth when the numeral is above the letter, mandibular teeth when below the letter. The new terminology is here adopted.

It is thus seen that Charts I and II give the maxillary first molar and mandibular first molar as the most frequently affected, Chart III the first maxillary incisor, and Chart IV the second mandibular molar and second maxillary molar. But the truth cannot be thoroughly determined except by the combined action of a committee of dental men who, carefully noting the onset of the condition, unanimous in their conception of the phenomena that constitute the initial stages, and willing to devote some time to charting

mouths, and generally adopting the principles as set forth on the covers of every copy of the "Dental Cosmos"—of Observing, Comparing, Reflecting and Recording.

DENTAL CARIES NOT A DISEASE

Dental caries is strictly not a disease; it is not caries. It does not resemble, in the very slightest, caries of bone, which is a form of ulceration following an

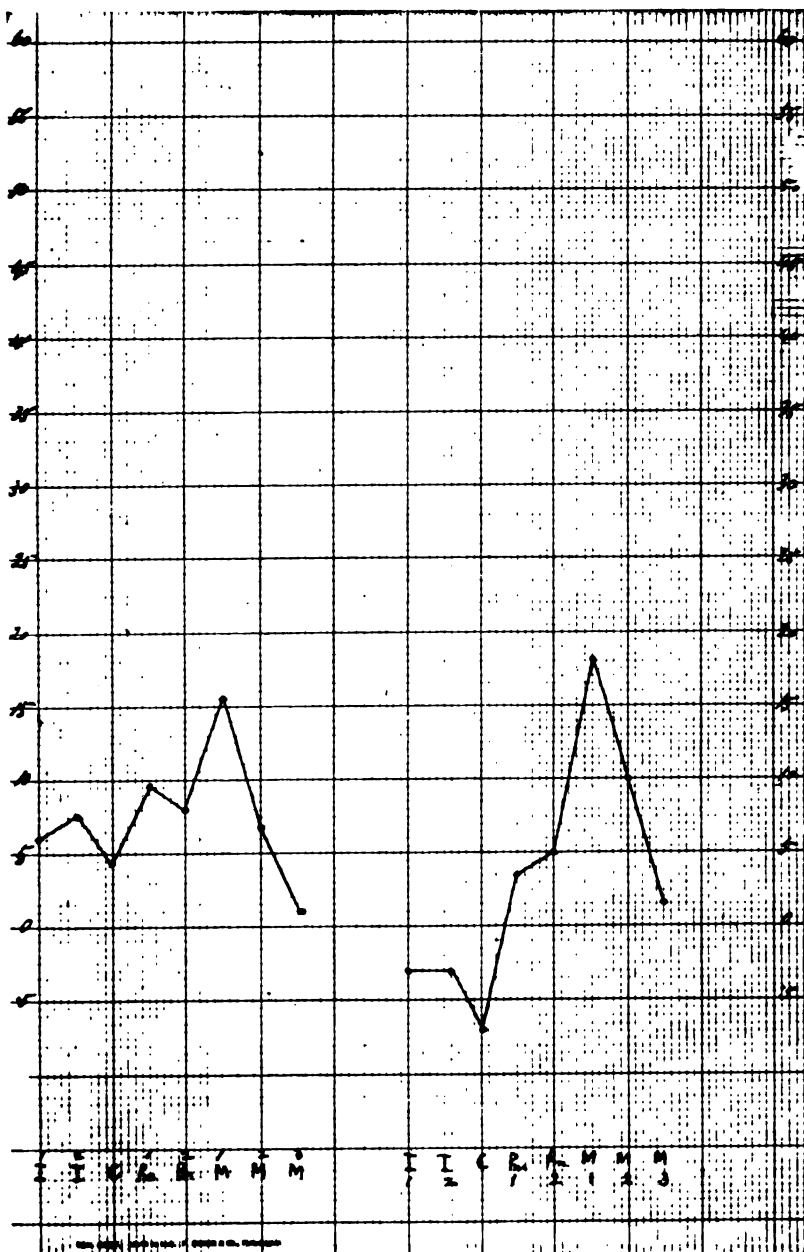


Chart I

osteitis due to subacute inflammation or tuberculosis or syphilis. A cavity in the hard palate which is often produced during the course of tertiary syphilis is a manifestation of the disease, is a necrosis of the bone—not a disease itself. Caries of enamel and dentine is not a disease, but a sign or manifestation of an external pathologic condition affecting the environment of these tissues. It cannot be communicated from person to person. It is neither strictly infectious nor contagious.

Further, dental caries can be so closely imitated in almost every particular *in vitro* that the same condition, developed *in vivo*, cannot under the microscope be distinguished from it. Moreover, it cannot be induced by inoculation in the tissues of the teeth *in situ*; neither can carious dentine, when placed in an artificially prepared cavity in a sound tooth, infect the healthy dentine, or extend from a carious dead deciduous tooth to its unerupted successor beneath.

What is its origin? Something occurring in the mouth must be the cause.

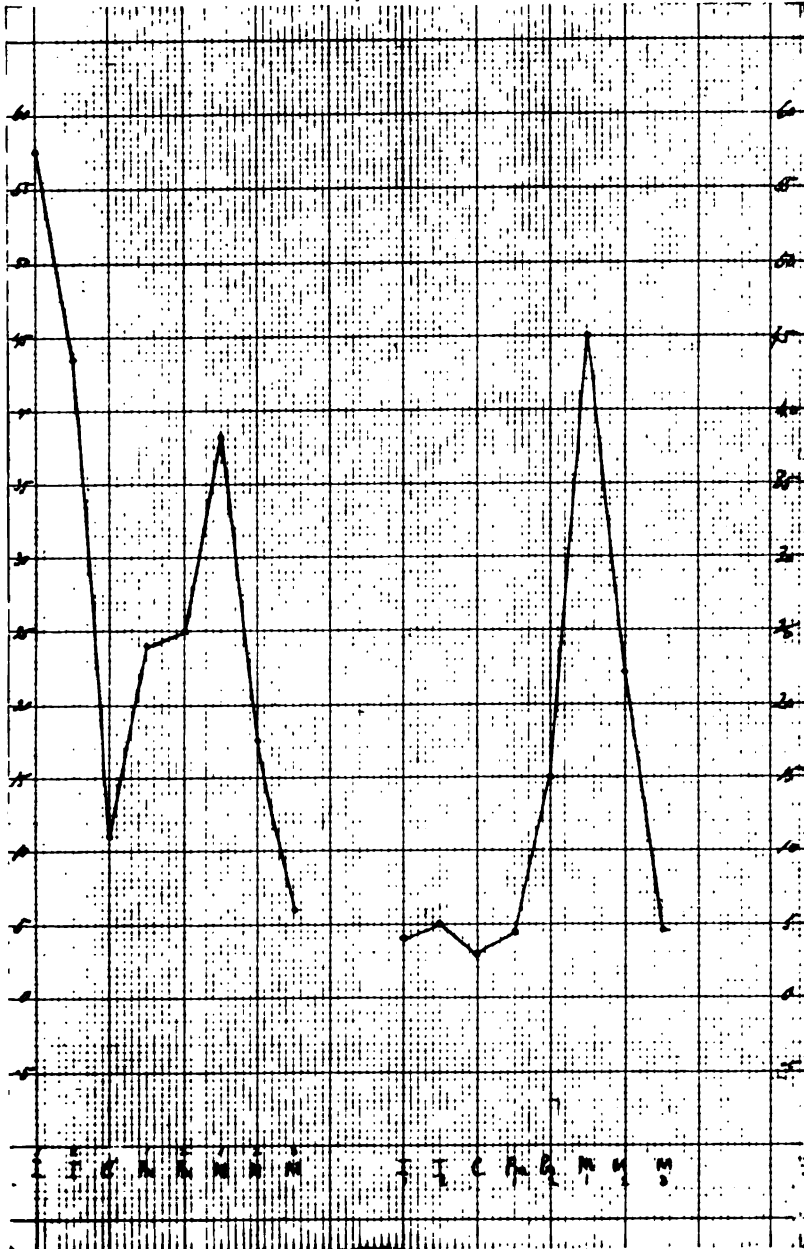


Chart III

The fermentation of carbohydrates in the food followed by the production of lactic acid, and possibly other acids, is today generally accepted as the exciting factor. Yet it should be well known that the growth and action of the oral flora are inhibited by the presence of an acid medium. Mouth bacteria develop on alkaline or neutral media. Paradoxical though it may appear, it follows, therefore, that it is almost certain that acid solutions of vegetable or chemical character will prevent its onset.

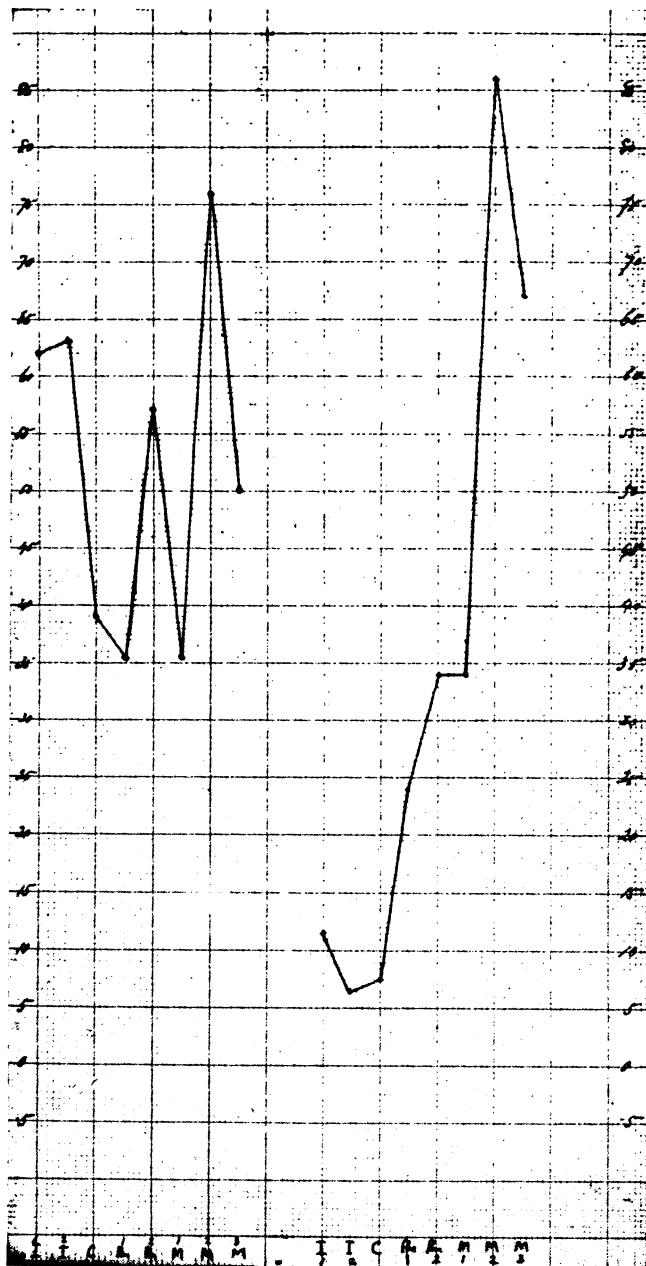


Chart IV

NEW DEFINITION OF CAUSATION

Dental caries may be considered to be a sign (or symptom) and a consequence, or result, of certain disturbances in the symbiosis, antibiosis, and commensalism of the flora of the mouth, occurring chiefly in early life, of which the precise nature is at present unknown. In other words, dental caries is a complication of the pathological condition produced by disharmonious relations existing at times between the various kinds of oral bacteria. Fuller investigations in this direction are greatly needed. The writer, however, believes the above to be the truth.

AGE INCIDENCE

It is a well-recognized fact that the closer he attains to adult life the less and less liable ("susceptible?") to dental caries does an individual become, and therefore that dental caries is a condition of the teeth peculiarly associated with infancy and adolescence.

In response to inquiry submitted by the writer to a number of dental surgeons particularly interested in the matter, some time ago, why this should be, the following among other suggestions were offered: Children eat great quantities of sugar in the form of candy; infectivity; differences in constitution and character of the saliva or oral secretions predisposing to and facilitating lactic acid fermentation of carbohydrates; some teeth being physically and structurally more susceptible than others; congenital dental defects; the "brittleness" of newly erupted teeth; incomplete calcification of the dental tissues; children's illnesses; sugar diet; nonuse of substances such as "coffee, tobacco, wine, spirits, etc." supposed by some people "to neutralize the saliva," etc.

The following may be given today as the probable and common-sense reasons:

(1) The adult has a freer flow of saliva than the child, which, acting mechanically, washes away from Nasmyth's membrane and the surface of the enamel many bacteria in available positions. This copious flow of saliva is dependent on the excitation of the secretory nerves of the salivary glands, viz., the cervical sympathetic, glossopharyngeal, and *chorda tympani*—brought about largely by stimulation of food, muscular movements, presence of acids in the mouth, and the frequently occurring reflexes of the optic, olfactory and gustatory nerves. These are yet being developed in the child, whose glandular apparatus and activities of the organs of sense are as yet inexperienced.

(2) The process of phagocytosis is more effective at this period through the complete development and growth and proper functioning of the tonsils. It is extremely probable that the leucocytes in the mouth, which are phagocytic in function, are derived from the tonsils. Weakly children predisposed to tuberculosis often suffer from chronic hypertrophic tonsillitis. Here the process of phagocytosis is presumably impaired and fewer opportunities for combating and destroying harmful bacteria are presented.

(3) The physiologic resistance and defensive mechanisms of the mouth, as of the body generally of the adult, are greater than those of the child.

(4) The food of the adult is more complex and perhaps often somewhat more acid in character than that of the child. Generally speaking it is more

solid in substance. The caries-producing organisms become, therefore, incorporated into the bolus of food and carried into the stomach, where they are immediately destroyed by the gastric juice.

(5) The adult obeys the rules of oral hygiene more frequently and more effectively than the infant, using mechanical means for getting rid of caries-producing organisms by washing his mouth, drinking water or other fluids, cleansing with tongue and lips, as well as actually brushing the teeth.

The numbers of bacteria found in the secretions of the healthy oral cavity have been computed by F. W. Andrewes⁴ as from ten to a hundred million per cubic centimeter. As the stomach and duodenum empty themselves properly after each meal, the former is well scoured and a large proportion of the oral bacteria swallowed perish during digestion, these two portions of the alimentary tract containing extremely few in a healthy state. But in the cecum and colon, in consequence of highly favorable conditions, the bacteria are enormously multiplied and their number as estimated per gram of normal excreta, range from a hundred to a thousand millions.

It is obvious that to diminish the occurrence of dental caries in childhood and adolescence, and prevent it at later periods of life, all effort should be made to reduce the number and to inhibit the growth and action of bacteria. This can be done equally well, if not better, by the free use of water and mechanical and muscular aids—brush, lips, tongue—than by the exhibition of antiseptic mouth washes, powders and soaps. An acid mouth wash is extremely desirable at times.

PYORRHEA ALVEOLARIS

Probably the next most discussed subject in dental pathology is that of pyorrhea alveolaris. Much confusion as to the nature of this condition exists. Contrary to dental caries, it is generally understood to be found exclusively in adult life. The writer has repeatedly seen it in children, as early as ten years, sometimes predisposed to by acute attacks of scarlet fever followed by severe and persistent anemia. Contrary to the accepted opinion, pyorrhea alveolaris is not a disease; it is, as the name implies, an exudation of pus from the gingival troughs. It is a symptom of oral sepsis, as it is also a symptom of dentoalveolar abscess and of catarrhal and mercurial stomatitis.

A SYMPTOM OF ORAL SEPSIS

With regard to the first-named oral condition, it may be the only sign. One of the reasons why there is so much mental confusion over this subject is because of the failure on the part of the dentist or physician to always recognize the nature of the exudative material at the gingivodental margins. If the microscope was more frequently brought into use in this connection alone, fewer mistaken diagnoses would be made. The observer jumps to conclusions too readily. The writer recalls the case of a man in midlife who apparently presented most of the signs of secondary (pernicious?) anemia, attributed by his medical man to pyorrhea alveolaris. The face, gums, lips, cheeks, tongue were practically colorless. The diagnosis was septic intoxication from pyorrhea alveolaris. The patient had no appreciable degree of oral sepsis; the pale

appearance of the mucous membrane and skin being really due, it ultimately transpired, to cancerous cachexia, for he died of a gastric carcinoma.

It is necessary to examine the exudate under the microscope before one can actually state that pus is present in such and such a case. It is equally necessary to make a blood count, preferably by means of an accurate and rapid method in which the Thoma-Zeiss pipette and microscopic slide are employed. In less than ten minutes the number of red and colorless blood corpuscles per cubic millimeter can be estimated.*

If examination of the gingival exudate and the making of a blood count were more frequently practiced much more satisfactory knowledge of the true nature and character of pyorrhea alveolaris would be accomplished.

Pyorrhea alveolaris may be regarded as a very simple symptom of a somewhat obscure disease of the oral cavity, viz., oral sepsis. If an infection of the mouth occurs and pathogenic organisms abound and perhaps predominate, pyorrhea alveolaris may become manifest, provided that local conditions are suitable.

LOCAL CONDITIONS PREDISPOSING TO PYORRHEA ALVEOLARIS

(1) Atrophy of the margins of the alveolar process, the result of anemia, and the unusual and in fact unique anatomic characteristics of the parts, and deepening of the gingival trough, is of great importance. The latter is associated with malocclusion, traumatism, infection from decomposing food, etc.

(2) A suitable nidus for the development of pyogenic organisms. The normal contents of the gingival trough, which generally extends from two to three or three and a half millimeters, are desquamated epithelial cells, saliva, debris of food, polymorphonuclear leucocytes and bacteria of the *Micrococcus Catarrhalis* and *Streptococcus* type.

In the early stage of this infection of a "pocket" the gums are normal or anemic and appear to be shrunken with the physiologically absorbed or atrophied bone beneath; pus exudes on pressure only; the teeth are not loose; the breath is foul, but there is *no pain*.

Later on a gingivitis is present, with or without periodontitis. The pockets are deep, pus is copious, the roots of the teeth are exposed and are themselves loose, but not painful unless the periodontal membrane is inflamed; the breath is foul.

*The enumeration of blood corpuscles can be obtained by the following method:

A certain amount of blood is drawn from the supposedly affected individual and diluted a known number of times with sodium sulphate solution of S. G. 1025.

The diluted blood is evenly spread on a special glass slide hollowed out on its upper surface and ruled in the center in a square measuring one square millimeter. This is subdivided into sixteen smaller squares, each of which is again subdivided into twenty-five very small squares. When a cover glass is placed over the cell 0.1 mm. deep each smallest square contains 1/4000th of a cubic millimeter of diluted blood.

Under the microscope the number of squares covered by the blood is ascertained, and the number of erythrocytes (red cells) and leucocytes which are easily recognized, noted. By means of the following formula an estimate of the number of corpuscles per cubic millimeter is accurately made: If A = the number of corpuscles counted, B, the number of squares counted, and C, the number of times the blood has been diluted:

$$\frac{A \times C \times 4000}{B} = \text{number of corpuscles.}$$

A normal blood count contains, per cubic millimeter, 5,120,000 erythrocytes and 7,000 leucocytes. If secondary anemia is suspected and exists, an examination will probably show erythrocytes 3,000,000 and leucocytes 23,000 per cubic millimeter.

DISEASES OF THE DENTAL PULP

Disturbances of the circulatory and nervous systems are the chief exciting causes of inflammation and degeneration, which sums up in two words the chief pathologic conditions of this all-important and vital organ.

The general predisposing causes may be grouped as due to (1) heredity, (2) sex, (3) age (the pulps of deciduous teeth, in addition to becoming inflamed, frequently undergo degeneration of a fibroid or calcareous type), (4) marasmus, (5) long-continued fevers.

LOCAL PREDISPOSING CAUSES

The local predisposing causes, based on the unique anatomical and physiologic characteristics of the pulp, are as follows:

(1) Absence of collateral circulation, which nullifies any attempts at reparative action or healing of parts or individual regions of the tissue.

(2) The valveless construction of the veins, thus inducing and favoring the production of venous hyperemia.

(3) Lack of an organized lymphatic system, carrying away waste products and inflammatory exudates.

(4) Its enclosure in unyielding walls of dentine, which thus injures it through accumulation of exudates.

(5) Absence of *direct* nervous control over its environment.

(6) Its constant subjection to rapid and extreme changes of temperature.

(7) The frequent presence of fillings, which are thermal conductors and alter the physical qualities of dentine.

(8) The frequent presence of adventitious dentine, which diminishes the cubic capacity of the pulp cavity.

(9) The early normal closure or complete formation of the apical foramina of the teeth themselves.*

All the above, severally or collectively, have a marked effect in the production of hyperemia and inflammation, with their varieties and terminations.

Recent observations completely confirm the existence, on clinical and physiologic grounds, of the segmental areas of the skin of the face, originally described by Prof. Henry Head,⁹ as valuable aids to diagnosis. One is beginning to know something of the phenomena of odontalgia or neuralgia set up at times in teeth which have no recognizable lesion.

CAUSES OF OBSCURE ODONTALGIA

It can therefore be related that obscure causes of odontalgia may be ascribed to the following:¹⁰

- (1) Increased or diminished blood pressure in the pulp.
- (2) The presence of pulp nodules.
- (3) Altered chemical constituents of the blood.
- (4) Intraoral electrical impulses.

*The dates of "closure," or complete formation of the apical foramina of the individual teeth, are approximately: Maxillary first incisor, 11th year; maxillary second incisor, 11th year; maxillary canine, 13th year; maxillary first premolar, 12th year; maxillary second premolar, 12th year; maxillary first molar, 12th year; maxillary second molar, 15th year; maxillary third molar, 19th year; mandibular first incisor, 10th year; mandibular second incisor, 11th year; mandibular canine, 13th year; mandibular first premolar, 12th year; mandibular second premolar, 12th year; mandibular first molar, 11th year; mandibular second molar, 16th year, and mandibular third molar, 21st year.

(5) Reflex conditions associated with the gustatory and *chorda-tympani* nerves.

(6) Pathologic diseases of the Vth nerve.

(7) General neurasthenia and debility.

Finally in an important society such as this, whose members are chiefly concerned in the treatment of children, who can be watched more easily than their parents, many opportunities must arise for the prosecution of an investigation on some of the argumentative subjects briefly referred to above—researches of high value and of lasting benefit to dental science and the community at large.

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DISCUSSION

Dr. M. N. Federspiel, Milwaukee, Wisconsin.—It seems to me, orthodontists who appreciate the prognosis of malocclusion, who can appreciate the difficulties they have to encounter, will sooner or later, if they have not at the present time, realize that in our science, or I might better say, in our branch of medicine; we must have a better understanding of the fundamental principles of histopathology.

I cannot go into the question of decay of the teeth, much as I would like to, because I am not prepared. I enjoyed Dr. Hopewell-Smith's remarks about the so-called pyorrhea alveolaris, and the importance of discriminating between the pathologic phases that occur.

I believe we have not been devoting enough time to the study of focal infection, and we must give more consideration to the pathologic phenomena that take place in the peridental membrane.

You have all heard him speak of granulomas. This mass is nothing more than a proliferation of connective tissue.

I wish I could discuss this scholarly paper in a better way, but I was not on the program, and had no opportunity to read this paper. However, this paper proves that when we have men like Dr. Hopewell Smith come before our society, it has a tendency to uplift orthodontia.

The President (Dr. Mershon).—It is very plain to me, gentlemen, that it is possible for men to become too highly specialized and forget there is any other department except the one they are directly working on and interested in. We must remember as specialists that we cannot treat just one organ, or deal with one particular part of an organ. We are concerned with mouth conditions at large. Dr. Hopewell-Smith has presented a phase of this subject in which we must be intensely interested.

I am going to throw the subject open for general discussion, and I hope the men will be prompt in what they have to say.

Dr. Milo Hellman, New York City.—Before I say anything, I should like to ask Dr. Hopewell-Smith to tell me whether I understood him correctly, that is, that caries is more prevalent in children than in adults. At what age do you mean that caries is more prevalent in children than in adults?

Dr. Hopewell-Smith.—From ten to twenty-five.

Dr. Hellman.—It is of interest to notice in what manifold ways evidence can be obtained that may be applicable to the phenomena of greatest interest to an individual. In studies on

growth in general, correlations may be made that add considerably to the appreciation of the interrelationship of various physiologic manifestations. Thus it is a well-established fact that the rate of growth reaches its highest expression during the fifth month in fetal life. From that time on there is a general decline until the period of pubescence. During puberty, growth is again accelerated to be followed by a gradual but constant retardation.

These accelerations and retardations have been studied in correlation with various physiologic manifestations. Thus, ossification of the carpus has been found to be in intimate relationship to growth as measured by height and weight. Also pubescence is closely associated with growth as is the process of teething. In a recent study as presented yesterday before this society, I have found that variations in occlusion stand in intimate relationship to growth.

From Dr. Hopewell-Smith's paper, I gather that also dental caries may be associated with growth. From figures kindly furnished me by Dr. Hopewell-Smith, it is evident that during the period of retardation in growth, there is an increase in dental caries. That is, there is an inverse correlation. Thus, from statistics collected by the British Dental Association about twenty years ago, the percentage of defective teeth, of children between 4 and 6 years of age is about 76.2 increasing to 86.8 between the ages of 7 to 9 when growth is at its lowest rate. With the acceleration of growth beginning at this age, there is a decrease in the manifestation of caries. Thus, between the ages of 10 to 12 the percentage of defective teeth drops to 83.9, and as growth begins to retard after puberty the percentage of defective teeth again rises to 85.9 at 13 to 15 years of age and shows its height of 93.6 at the ages of 16 to 18 years.

Another point of interest to me was the graphic representation by Dr. Hopewell-Smith of the frequency of caries in the different teeth in the same mouths. As you have noticed in his diagram, the figures demonstrating the frequency of occurrence of such decay assumed the form of the curve of probability. In my talk to you yesterday, I explained that all biologic phenomena must conform to this figure if scientifically treated. It is, therefore, of considerable gratification to me to see my arguments supported by the essayist's scientific procedure.

With reference to the origin of the osteoclasts, I am reluctant to accept Dr. Hopewell-Smith's contention that they are degenerated osteoblasts. According to Guido Fischer all manifestations in bone changes are preceded by a hyperemia surrounding the affected region. This hyperemia is affected by a considerable increase in the number of capillaries. The capillary vessel walls thereafter disintegrate and the endothelial cells constituting them become independent cells metamorphosing into osteoclasts. The extensive histologic evidence brought out by Fischer is so convincing that it is difficult to depart from his views.

The effect of hyperemia in the oral cavity is of unusual interest when considered in relation to its effect on bone changes. As orthodontists, we are—or should be—greatly interested in the influence of normal and pathologic oral tissues upon the character of bone changes associated with tooth movement. According to the experiments of Dr. Albin Oppenheim, the artificial movement of teeth is accompanied by structural modifications in the bone tissues surrounding them. These modifications are definite and characteristic of the tissues involved and of the force exerted. Thus, gentle and continuous force brings about normal histologic changes while excessive force produces pathologic conditions without structural modification. Subsequent to tooth movement, there is a readjustment of the bone elements simulating previous conditions. But, although the bone spicules reassume their former orientation, there still remain areas of unossified bone surrounding them. Thus, by the assistance of a retaining appliance, the calcified portion exceeds the uncalcified zone, while when no retaining appliance is used the latter preponderates. It becomes, then, a question of considerable significance as to these manifestations under anemic and hyperemic conditions. The solution of future problems of the orthodontist will in a great measure depend upon a thorough knowledge of bone changes under physiologic and the various pathologic conditions encountered in the human mouth.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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FOCAL INFECTION OF ORAL ORIGIN

BY SAMUEL McCLARY, III, M.D., PHILADELPHIA, PA.

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THE IMPORTANCE which focal infection plays in the causation of systemic disease is becoming more apparent. A list which includes those diseases in which the relation has been definitely established and those in which foci of infection are thought to be important etiologic factors would cover many disorders, affecting nearly all organs of the body.

Among those diseases, whose definite relation to focal infection has been established, we may mention acute and chronic rheumatism, neuritis, acute and chronic nephritis, the cardiovascular diseases and chronic arthritis. Among the conditions in which focal infection is suspected to be an important etiologic factor are included: appendicitis, gall bladder infection, goiter, certain skin eruptions, anemia and bronchial asthma.

The principal regions in which we find foci of infection are the genito-urinary tract, the nasal accessory sinuses, the tonsils and teeth; consequently the oral surgeon and dentist should be alert in detecting these conditions in the mouth and know how best to correct them.

LATENCY OF INFECTION

Rosenow, in 1914, in *The Journal of Infectious Diseases* for January, states that the acute conditions are not so important and emphasizes the fact that the chronic conditions may remain unsuspected for a long time, and that it is the so-called blind abscesses and granulomata, which seldom give rise to noticeable symptoms, that favor the continuance of bacteria in these foci, which gradually increase in size and slowly produce absorption and disease of the adjacent bone substance.

In the *Journal of the American Medical Association* for September, 1916, Irons reports some interesting data bearing on this subject. In patients with

arthritic conditions 76 per cent had alveolar abscesses. In the group of cardiovascular 47 per cent had alveolar abscesses. Abnormal tonsils were found in 40 per cent of the arthritic cases and 24 per cent of the cardiovascular cases.

The effects of focal infection have been strongly impressed on the medical profession and the medical men are frequently censuring the dentists for improper care and treatment of oral infections; therefore it is necessary that the dentist improve his technic and study all cases carefully, so that both professions may come to some definite conclusions as to the best methods of treating certain oral conditions.

X-RAYS USEFUL IN DIAGNOSIS

One of the best means of aiding diagnosis is the use of x-rays by a competent operator, and the proper interpretation of these findings, and, better still, a series of radiograms during the course of treatment, so as to have a definite knowledge as to whether the case is progressing toward a cure or not. For example, an apical abscess, according to many dentists, can be cured by proper treatment without extraction of the tooth. A series of radiograms during, and subsequent to, the treatment would be of great value in determining what is the best method to follow. We personally doubt that most apical abscesses can be cured by drainage through the root canal; an apicoectomy may eradicate the infection, provided the abscess cavity is accessible and can be thoroughly curetted, but in many cases there is a pericemental abscess also, and it seems logical to a surgeon that the most certain method of cure is removal of the tooth and curettement of the alveolus.

There are many cases in which these apical abscesses remain dormant for a long time, and when for some reason the patient's resistance becomes lowered, the abscess assumes renewed vitality and produces systemic infection; therefore, when they are known to exist we should adopt measures to eradicate them thoroughly.

TREATMENT

The treatment of oral infections is both prophylactic and active. Prophylaxis should commence at birth and be continued throughout life. The nursing infant's mouth should receive scrupulous care; actively scrubbing it is unnecessary, flushing it out with normal salt solution or sterile water is advisable, but the important point to observe is to see that the breast, nipples and anything that enters the mouth is absolutely clean. During the period of dentition it is necessary to keep the teeth cleaned properly and at the same time not injure the mucous membrane. Proper breathing is essential and any pathologic condition that interferes with nasal breathing should be corrected, as mouth breathing is an important factor in oral sepsis. Cavities should be promptly filled and a dentist should be consulted at regular intervals.

The condition of the mouth in adults should be even more carefully regarded and in users of tobacco this is extremely important. The irritation of the gums and mucous membrane produced by tobacco predisposes to oral infection and recession of the gums.

The active treatment should consist in measures to restore diseased parts to normal conditions. Salivary calculi are probably responsible for the beginning of dento-alveolitis in many cases, and careful scaling at frequent intervals, in cases which have this deposit, is one of the best means to avoid oral infection. If the mouth condition has progressed so far that general symptoms are present, attention must be paid to both local and systemic manifestations.

The proper course to pursue in a patient suffering from a disease probably caused by oral infection may be outlined as follows: Have the tonsils examined by a competent laryngologist and removed if diseased. Procure good radiograms of all the teeth and their supporting structures, including the antrum, and then have these radiograms read by a competent person. If questionable areas are found a blood examination may be of some value, and in the differential count an increase in the polymorphonuclears from about 65 per cent to 72 per cent and over indicates infection. Now comes the important problem, and it must be decided whether the infection can be eliminated with retention of the teeth, or if extraction is indicated, with or without curettement.

EXTENSION TO ANTRUM

We must consider infections in the antrum, as 75 per cent of these come from diseased teeth. If careful examinations are made we will often find that the apices of one or more teeth project into the antrum, consequently abscesses at the apices of such teeth would subject the antrum to infection and we cannot cure the patient by simply treating the tooth.

Ballenger states that the maxillary sinus is more frequently affected singly than any of the other sinuses, because in one-half of the cases it is infected from the teeth rather than from the nose, whereas the other sinuses are infected from the nose. It is especially important for the dentist, radiographer and surgeon to cooperate in these cases where there is no evidence of alveolar abscesses, and the teeth should be tested with heat and cold and transmitted light to determine the condition of the tooth pulp. The socket of any diseased root that may be extracted should be carefully disinfected and explored with a sterile probe, in order to determine whether there is an entrance into the antrum, and if the infection extends into the antrum it is best to enlarge this opening and provide adequate drainage. Where there is no necrotic bone in the antrum and it is not filled with polyps, drainage through the alveolar process is usually sufficient, but when either of these conditions exists, it is best to do a radical operation such as removing the anterior wall of the antrum in the region of the canine fossa.

ETIOLOGIC IMPORTANCE OF TONSILS

The tonsils play almost as important a part in causing systemic infection as do the teeth, and as their structure is especially suited to retain infection and still show little or no evidence they are frequently overlooked. The recognition of an acute tonsillar infection is an easy matter, but it is the chronic cases without any marked symptoms in the tonsils that are frequently overlooked.

When the tonsils are much enlarged the presence of tonsillitis is easily determined, but an enlarged tonsil does not always mean an infected tonsil. We often see tonsils in children that distinctly project into the pharynx and do not advise their removal when they are superficial and do not lie embedded between the folds of the soft palate. In adults we usually advise the removal of large tonsils, as they should have undergone retrograde absorption before adult life and only inflammation would cause them to retain their abnormal size.

In children enlarged tonsils are often due to inflammation and generally there is a history of tonsillitis, and these tonsils are generally markedly congested.

When tonsils are embedded they may be explored by a hook made of a bent probe, especially if the patient is made to gag, as gagging tends to protrude the tonsils into the pharynx and it is easier to explore the pockets for cheesy secretions which indicate chronic inflammation. When we find that the surface of a tonsil and the anterior pillar is congested, more so than the remaining mucous membrane of the pharynx, we may feel reasonably certain that there exists a state of chronic inflammation.

INDICATIONS FOR REMOVAL OF TONSILS

- I. In children when large enough to interfere with respiration.
 - II. In children who have suffered from a serious systemic infection, such as endocarditis or an acute nephritis following an attack of tonsillitis.
 - III. When there is a cervical adenitis and the tonsils show evidence of either acute or chronic inflammation.
 - IV. In all cases where there is a history of recurring attacks of tonsillitis.
 - V. In all cases where the tonsils are chronically infected, shown by congestion about the tonsils and the presence of cheesy concretions.
- In adults the removal of the tonsils should be advised:
- I. In all cases where there is a history of recurrent attacks of tonsillitis.
 - II. In cases in which the tonsils show signs of chronic inflammation, especially where there has been some systemic infection.
 - III. In cases which show marked evidence of chronic inflammation, even though the patient has no systemic infection or local discomfort.

We cannot promise the patient that removal of the tonsils will always cure a systemic infection, but we should explain to him that the chances are that his condition will be improved by this procedure. This will also apply to infections in the antrum and around the teeth. The pathologic condition should not be present and its existence is sufficient reason for its elimination.

OPERATION FOR REMOVAL OF TONSILS

The practice of using a tonsillitome and amputating the tonsils has proved inadequate, as frequently the infection persists in the remaining tonsillar tissue and the patient has as much or more trouble than before operation. Complete excision of the tonsils is necessary, and for this purpose they must be dissected free from the pillars and are best removed with a snare. The Sluder instrument works well in removing tonsils that are not buried, but we have frequently

seen secondary hemorrhage following its use, and as it can be used only in selected cases, we feel that the snare is the most satisfactory and safest instrument.

Hemorrhage is seldom troublesome and is usually controlled by pressure or the application of a hemostat for a few minutes; all cases should remain in the operating room under observation for at least ten minutes after the operation is finished and hemorrhage is controlled.

The blood pressure should always be taken before operating on an adult, as high blood pressure increases the danger of hemorrhage. In both adults and children hemophilia must be eliminated and in any case with a suspicious history the coagulation time should be determined, and if it is delayed, proper measures should be taken to correct it before operation.

CONCLUSIONS

Defective teeth reduce physical efficiency. Dirty, suppurating mouths and other foci of infection are frequently responsible for many cases of rheumatism and other chronic affections. The dentist is no longer concerned solely with the repair, treatment, and replacement of teeth. He is concerned more seriously with his patient's health and life.

There should be cordial cooperation between the surgeon, the internist and the dentist in the treatment of these cases, as even with the most careful study many of them are obscure.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

CLINICAL VALUE OF THE ELECTRIC TEST FOR PULP VITALITY

BY HOWARD R. RAPER, D.D.S., INDIANAPOLIS, IND.

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and Junior Dean, I. D. C.*

THERE are many sorts of cases in which the electric test for pulp vitality may be applied to great advantage by the diagnostician. It is not possible to mention all the circumstances under which its application will prove helpful, and, if it were, the mere mention of such circumstances and cases would fail to impress the reader or teach him so effectively as the illustrated description of cases.

Nevertheless, some written effort to indicate the extent of the value of the test seems necessary and is set forth in this chapter.

The following is a list of cases and circumstances in which and under which the test may be used to advantage:

- (1) In cases of somatic disease to determine which teeth are most suspicious.
- (2) Where no x-ray machine is available. (3) To check all x-ray findings. (4) To find teeth with dead pulps which could not be found by any other means.
- (5) To find abscesses which might otherwise be overlooked because they fail to show in radiographs made at certain angles. (6) To assist in recognizing very slight osteoclasia. (7) To avoid mistakes when the end of a root and an abscess cavity (with no connection between the two) overlap in the radiograph due to the angle at which the exposure is made. (8) To avoid misinterpretation when the abscess cavity laps to the lingual or facial of the adjacent teeth. (9) To differentiate between the mental foramen and an abscess cavity. (10) To differentiate between the anterior palatine, or incisive, foramen and an abscess cavity. (11) To differentiate between the antrum of Highmore and an abscess cavity. (12) To differentiate between the somewhat radiolucent area which

sometimes appears in the apical region of upper lateral incisors, due to the canine, or incisal, fossæ, and radiolucence caused by infection and pathologic bone change. (13) To differentiate between nostril spots and abscesses. (14) To aid in the recognition of nasal fossæ spots as such. (15) To aid in the recognition of the inferior dental canal as such. (16) To differentiate between a very small abscess cavity and an unusually large periapical space. (17) To differentiate between a cancellous spot of unusual appearance and an abscess cavity. (18) To assist in differentiation between pathologic and physiologic conditions about the buccal roots of the upper molars. (19) To assist in differentiation between an absorbed, roughened root and a radiograph made with the rays directed through the tooth diagonally from facial to lingual. (20) To differentiate between partially formed root and an abscess. (21) To determine how many teeth are involved in an abscess. (22) To assist in differentiation between dentoalveolar abscess and peridontoclasia (pyorrhea).

1. IN CASES OF SOMATIC DISEASE TO DETERMINE WHICH TEETH ARE MOST SUSPICIOUS

The determination of which teeth are most suspicious aids in many ways. If the cost of examination is to be cut to the minimum those teeth which respond perfectly to the test need not be radiographed. And even if all of the teeth are to be radiographed, those which respond to the electric test need not be radiographed or studied with such care as those which cannot be tested or test negatively. Thus the number of negatives it is necessary to make is reduced and at the same time the operator's attention is directed to those parts where make-overs are most likely to be indicated.

It is always the part of wisdom to avoid unnecessary x-ray exposure, and in some emergency cases where the operator happens to be operating with inadequate protection this is especially true.

Much has been said of x-ray pictures relieving the operator of the necessity of working in the dark. The electric test relieves the x-ray operator himself from the handicap of working in the dark and so enables him to make a better examination.

In cases of systemic disease examination of the mouth for infection is made in one of three ways: (1) All teeth and all parts of the mouth are radiographed. (2) All teeth which do not react positively to the electric test, or cannot be tested, all regions from which teeth are missing, and all teeth affected, or thought to be affected, with pyorrhea and all regions of unusual appearance are radiographed. (3) The teeth which react negatively and those which cannot be tested are radiographed.

For the reasons already given, the writer applies the electric test even if all the teeth are to be radiographed and whether it is permissible to eliminate parts of the mouth from the necessity of examination at all or not depends on two things: The operator's judgment and the electric test.

When the examination is for pulpless and abscessed teeth only, those regions in which the teeth respond perfectly and positively to the test need not be radiographed. When the examination is more inclusive, such regions may be radiographed and may reveal such lesions as carious cavities, overhanging fillings, incipient pyorrhea, odontomata, and supernumerary teeth.

Where we speak of the application of the test we assume that its application is made in a competent, intelligent manner, for unless this is the case, the electric test, like all tests under similar circumstances, is useless.

2. WHERE NO X-RAY MACHINE IS AVAILABLE

Where no x-ray machine is available the only way to determine which teeth are pulpless with any degree of accuracy is to use the electric test. This will, in most cases, enable the operator to locate the pulpless teeth quite successfully. A friend who "believes in the extraction of all pulpless teeth" maintains that the determination of which teeth are pulpless is all that is necessary and that if this can be done with the electric test then radiographs are unnecessary. He fails to consider the value of the radiograph to verify his electric test findings, and, further, the radiograph, by showing the amount of bone destruction, assists in curettement, so it helps even the extreme extractionist. It is necessary to remove shell crowns before the teeth carrying them can be tested. Where we have the combination of a seriously sick patient and no x-ray machine available, the test may be used to locate the pulpless teeth. Thus extraction of teeth with vital pulps may be avoided and at the same time all periapical infection is eliminated.

+ = Responds to electric test for pulp vitality.

- = Does not respond to electric test.

+S = Responds to electric test strong.

+VS = Responds to electric tests very strong.

+W = Responds to electric test weak.

+VW = Responds to electric test very weak.

+? = Responds to electric test but question if this indicates vital pulp.

-? = Does not respond to electric test but question if this indicates pulpless tooth.

CT = Cannot test.

O = Crown.

M = Missing.

R = Root or Roots.

Remarks: _____

Treatment and subsequent history: over.

Fig. 1.

3. TO CHECK ALL X-RAY FINDINGS

Both the electric test and radiograph are quite susceptible to error—to misinterpretation let us say—but taken together, letting the one check the other, chance for error if not entirely eliminated, is reduced to an agreeable minimum.

The writer started to use the electric test in his practice of radiodontia in selected cases and came gradually to use it in all cases. It is my practice now to apply the test first, in all cases where radiographs are to be made, and to make records of the results of the application of the test on the chart illustrated

in Fig. 1. From the records on the electric test chart, the recorded history of the case, and the finished, mounted radiographic negatives, a diagnosis and prognosis are given.

In cases where a tooth is suspected of being pulpless or abscessed and an x-ray examination is to be made of such a tooth the writer makes it an invariable rule to test at least the two teeth approximating the one under examination.

4. TO FIND TEETH WITH DEAD PULPS WHICH COULD NOT BE FOUND BY ANY OTHER MEANS

A tooth with (as yet) no periapical bone change, or filling material in the pulp chamber or canals that has a dead pulp cannot be located by means of radiographs. Such teeth may be found by the use of the electric test. When the symptoms (there may or may not be symptoms) are such as to place a certain tooth under suspicion the electric test *will assist* in diagnosis.

5. TO FIND ABSCESES WHICH MIGHT OTHERWISE BE OVERLOOKED BECAUSE THEY FAIL TO SHOW IN RADIOGRAPHS MADE AT CERTAIN ANGLES

Let us consider a hypothetical case, the like of which is frequently met. A radiograph is made of a certain tooth. It shows no abscess and no canal filling. but the electric test for this tooth is negative. Also perhaps there are abscess symptoms, a fistula in the vicinity. Another radiograph is made at a different angle and shows osteoclasia. Thus an abscess cavity is found which, had it not been known that the tooth did not have a vital pulp, would have been overlooked.

Foreshortening of the upper teeth may result in the failure of an existing abscess cavity to show. Slight elongation is sometimes advantageous; it enables the operator to see abscess cavities which might otherwise be overlooked.

6. TO ASSIST IN RECOGNIZING SLIGHT OSTEOCLASIA

An area of osteoclasia may be so small that one is unable to say definitely whether it is really osteoclasia or not. In such cases, whether the pulp is vital or not may be the deciding factor. If the pulp is vital, of course the suspicious area is not a bone change due to infection, but, if the pulp is not vital, a suspicious area can be classed as osteoclasia due to infection, especially if there is some osteosclerosis also.

7. TO AVOID MISTAKES WHEN THE END OF A ROOT AND AN ABSCESS CAVITY (WITH NO CONNECTION BETWEEN THE TWO) OVERLAP IN THE RADIOGRAPH DUE TO THE ANGLE AT WHICH THE EXPOSURE IS MADE

When a tooth seems to be involved in an abscess, but responds to the electric test, it is sometimes possible to make radiographs at different angles which will show that, after all, the suspected tooth is not involved in the abscess cavity. If a root end is more or less surrounded by an abscess cavity it will register in radiographs, if at all, at the end of the affected tooth. But if the abscess cavity is at the side of the root, and the root end only appears to be involved in the abscess due to the angle of the x-rays, a shadow of the abscess cavity can usually be cast on the film away from the root end.

The electric test thus indicates the expediency of making more radiographs at different angles in such cases and keeps the operator from accepting false radiographic evidence. See Figs. 2 and 3.

Abscesses arising from the lingual roots of upper bicuspid not infrequently have the radiographic appearance of involving the cuspid and lateral incisor. This appearance of involvement in the radiographs may be due to actual lapping of the abscess cavity to the lingual of the cuspid or lateral or may be due to the angle at which the exposure is made.

8. TO AVOID MISINTERPRETATION WHEN THE ABSCESS CAVITY LAPS TO THE LINGUAL OR FACIAL OF THE ADJACENT TEETH

It is possible for an abscess cavity to lap to the lingual or facial of the roots of the adjacent teeth in such manner that healthy teeth have the appearance of being involved in the abscess. In such cases the electric test is often the deciding factor and so of the utmost importance.

This lapping of an abscess cavity is most likely to occur to the lingual in the upper teeth. Cysts, as well as abscesses, may lap to the lingual or facial of healthy, uninvolved teeth.

Fig. 2.

Fig. 3.

9. TO DIFFERENTIATE BETWEEN THE MENTAL FORAMEN AND AN ABSCESS CAVITY

The fact that the mental foramen may have the appearance of being an abscess of the first or second (usually second) lower bicuspid has become common knowledge. Such common knowledge in fact that the writer has seen an abscess cavity mistaken for the mental foramen!

Where the electric test can be applied and is positive, the operator may know that a radiolucent area at the apex of a lower bicuspid is the mental foramen. Where the response to the test is negative, the operator should look elsewhere in his radiograph to locate the mental foramen. It is sometimes best to make an extraoral radiograph for this purpose.

Where the result of the electric test is definitely positive all doubt is immediately and completely removed.

10. TO DIFFERENTIATE BETWEEN THE ANTERIOR PALATINE, OR INCISIVE FORAMEN
AND AN ABSCESS CAVITY

As with the mental foramen, the fact that the palatine foramen may be mistaken for an abscess is becoming so well known that there is danger of abscesses being mistaken for the anterior palatine foramen. And, as in the case of the mental foramen the electric test, when positive, enables the operator to make a prompt and accurate diagnosis.

When the test is negative an intraoral radiograph may be made in such manner as to cast the shadow of the palatine foramen between the roots of the central incisors, instead of the apex of the root of one of them.

I have mentioned it before but it is of sufficient importance to justify repetition: *When a radiolucent area can be cast away from the end of the root, it is not an abscess involving the end of the root.*

11. TO DIFFERENTIATE BETWEEN THE ANTRUM OF HIGHMORE AND AN
ABSCESS CAVITY

One familiar with the appearance of intraoral dental radiographs does not often have a great deal of difficulty in distinguishing the difference between the antrum of Highmore and an abscess cavity, but one less skilled in interpretation often has a great deal of difficulty in this respect. And even one skilled in interpretation will feel much more secure in the accuracy of his opinion if he verifies it by applying the electric test and finds that the pulps of the bicusps and molars are vital.

Some points of difference between the radiographic appearance of the antrum of Highmore and an abscess cavity are: Of course abscess cavities are usually not nearly so big as the antrum, but a small antrum may be much smaller than a very large abscess. The outline of the antrum is more symmetrical, less jagged, than the outline of an abscess cavity, as a rule. Also the outline of the antrum is rimmed with a thin radiopaque line, representing the walls of the antrum.

12. TO DIFFERENTIATE BETWEEN THE SOMEWHAT RADIOLOUCENT AREA WHICH
SOMETIMES APPEARS IN THE APICAL REGION OF UPPER LATERAL INCISORS,
DUE TO THE CANINE, OR INCISAL FOSSÆ, AND RADIOLOUCENCE CAUSED
BY INFECTION AND PATHOLOGIC BONE CHANGE

This seems to the writer to require no special explanation. As always the value of the electric test hinges on the fact that a tooth with a vital pulp cannot be abscessed.

13. TO DIFFERENTIATE BETWEEN NOSTRIL SPOTS AND ABSCESSSES

Like other things which cause radiolucent areas at the apices of the roots of teeth without actual involvement of the ends of the roots of the teeth, a nostril spot may be cast away from the end of the root by changing the angle of the x-rays.

14. TO AID IN THE RECOGNITION OF NASAL FOSSÆ SPOTS AS SUCH

Nasal fossæ spots are so characteristic in appearance that it is only occasionally that one is found which really resembles an abscess cavity. Dr. Noboru Teruuchi points out the fact that bilateral abscesses of similar size and shape, arising from the apices of the roots of the laterals, or centrals, might be mistaken for nasal fossæ spots.

15. TO AID IN THE RECOGNITION OF THE INFERIOR DENTAL CANAL AS SUCH

The inferior dental canal is characteristic in appearance to the operator familiar with radiograms, but may be mistaken for a pathologic lesion by one less familiar with the appearance of dental radiographs. A positive reaction from the application of the electric test would relieve uncertainty in some cases.

16. TO DIFFERENTIATE BETWEEN A VERY SMALL ABSCESS CAVITY AND AN UNUSUALLY LARGE PERIAPICAL SPACE

By periapical space the writer does not mean either an air space or a vacuum, but a space between the root end and the bone; a space doubtless filled with vascular tissue.

In the past there has been some discussion as to whether such spaces exist. I have seen them, and they resemble a small abscess cavity. One cannot confuse a large periapical space with a small abscess if the electric test is applied and the pulp found vital.

As further aids in differential diagnosis I may say that osteosclerosis is likely to occur in case of the abscess and that the lamina dura can probably be seen unbroken in the case of the large periapical space.

17. TO DIFFERENTIATE BETWEEN A CANCELLOUS SPOT OF UNUSUAL APPEARANCE AND AN ABSCESS CAVITY

In some cases the cancellous openings in the bone are abnormally large and I have seen them mistaken for abscesses. Such a mistake could not occur if the electric test were applied and the pulps of the suspected teeth found vital.

18. TO ASSIST IN DIFFERENTIATION BETWEEN PATHOLOGIC CONDITIONS AND PHYSIOLOGIC CONDITIONS ABOUT THE BUCCAL ROOTS OF UPPER MOLARS

When the parts are in a state of perfect health there is nevertheless sometimes radiolucent areas at the apices of the buccal roots of the upper molars. Also the distobuccal root of the upper molar is so small that it sometimes fails to show clearly in radiographs and leads the uninitiated to believe that there is root absorption. When the fact that the pulp in the tooth is vital can be established by the application of the electric test uncertainty in x-ray interpretation can be eliminated.

19. TO ASSIST IN DIFFERENTIATION BETWEEN ABSORBED, ROUGHENED ROOT AND A RADIOGRAPH MADE WITH THE RAYS DIRECTED THROUGH THE TOOTH DIAGONALLY FROM FACIAL TO LINGUAL

When a radiograph of the upper bicuspid is made with the rays passing diagonally through the teeth, the roots of the teeth in the radiograph not in-

frequently have a fuzzy, indistinct appearance. I have seen this appearance of the root mistaken for absorption of the root. Since the roots of vital teeth do not absorb, except in the most extraordinary cases, or in cases of pressure from unerupted tooth bodies, the establishment of the fact that the pulps are vital by means of the electric test eliminates all except the remotest possibility of root absorption.

In the case of the upper bicuspid the small roots sometimes fail to show distinctly and so may seem to be absorbed, like the distobuccal roots of upper molars.

20. TO DIFFERENTIATE BETWEEN PARTIALLY FORMED ROOT AND AN ABSCESS

If the fact that the pulp is vital can be established by means of the electric test, this mistake cannot occur. It is less likely to occur with the dentist who will take into account the age of the patient.

21. TO DETERMINE HOW MANY TEETH ARE INVOLVED IN AN ABSCESS

The writer recalls the first very large abscess he encountered in which five teeth were involved. By checking up the x-ray findings with the electric test and finding that those teeth which seemed to be abscessed did not respond to the electric test I felt much more certain of my diagnosis than I could have otherwise.

22. TO ASSIST IN DIFFERENTIATION BETWEEN DENTO-ALVEOLAR ABSCESS AND PERIDONTOKLASIA (PYORRHEA)

When serusal calculus on the roots of a tooth causes irritation, which in turn produces inflammation, and which in its turn results in suppuration, and the pus happens to penetrate the external alveolar plate, instead of following along the side of the root and discharging at the neck of the tooth, the clinical picture is almost identical with that of an abscess. But if the electric test shows that the tooth under suspicion of being abscessed has a vital pulp then the seat of the suppurative process may be looked for along the side of the root instead of at the apex.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Intermaxillary Wiring. J. D. Eby. The Journal of the National Dental Association, 1920, vii, No. 9, p. 771. (Illustrated.)

Two methods of intermaxillary wiring, described by the author and explained by a number of illustrations, have in his experience proved universal in application, have eliminated all the objections of other designs, and have added in exchange many desirable qualities. The great satisfaction of the first method lies in the facts that: (1) There is no bulk of wire; (2) the wire may be quickly cut; (3) they may be tightened daily with ease to the operator; (4) they rarely break; (5) if a wire breaks, it may be replaced without material injury to the others. The second method possesses all of the advantages of the preceding method, with the following additions: (1) If a patient is to receive an anesthetic, these wires may be placed so that the mouth may be left open until the danger of nausea is passed. (2) The tie wires may be cut in order to test the fracture and if it is found that solidification is not complete, they may be immediately replaced without all the necessary work of starting from the beginning.

Regarding the ordinary methods of immobilizing fractures of the mandible by means of intermaxillary wiring, the author points out that the general plan of procedure is usually clumsy, full of danger, tedious to insert, easily loosened, difficult to tighten, easily broken, hard to repair and usually attended with harassing trouble to the operator, pain to the patients, the results of which usually make it necessary to retain the wires longer and not infrequently inviting complications which may partake of a very serious nature. The description of the author's improved methods is supplemented by instructive figures showing intermaxillary wiring for postelevator fractures, for post-depressor fractures, and for multiple fractures of the mandible. The best materials to be found for the purpose are the large sizes of Angle's ligature wire or 22 G. pure annealed copper wire.

Structure and Development of the Dental Tissues. E. Retterer. La Revue de Stomatologie, 1920, xxii, No. 8, p. 437.

In all vertebrates, the dental anlage begins as an epithelial organ. Serving for the formation of the enamel, this predental organ governs the special development of the connective tissue cells of the papilla on which it rests. Under

its influence, the superficial cells of the papilla become hypertrophied and proceed to form the ivory and the enamel (odontoblasts and adamantoblasts). The peripheral extremities of the odontoblasts undergo a differentiation into hematoxylinophile fibrils and hyaloplasm. The fibrils are prolonged into the most superficial layers of the dentine and the enamel; the hyaloplasm becomes transformed, in the interval of the fibrils, into a reticular framework in which lime salts are deposited. When the mechanical action is weak or absent, the dentin persists in this condition and wears out before producing enamel; when the tooth acts only by its borders and serves only for cutting, the borders become covered with enamel, whereas the remainder of the surface presents nothing but dentin (incisors of ruminants). When the free portion or crown of the tooth serves for grinding, the enamel covers the entire triturating surface. This enamel is at first made up by a layer, the structure of which resembles that of the enamel of cutting teeth, but as the middle and outer layers become progressively richer in calcium salts, the external portions of the enamel are finally formed by a substance in which the mineral elements predominate. The enamel is accordingly not a tissue or a definite substance; there are as many varieties of enamel as there are degrees in the mechanical stimulation exerted upon the tooth.

Orbital Phlegmon Following Dental Extraction. Gerson. *Zahntechnische Rundschau*, 1920, No. 36, p. 416.

Diseases endangering life are a very uncommon sequel of dental measures, and the author accordingly wishes to report a case where a grave orbital phlegmon developed as a sequel of extraction, fortunately terminating in recovery. The patient, a woman twenty-eight years of age, was admitted to the hospital for a painful swelling of the upper jaw and left cheek, which had appeared two days after a small incisor tooth had been filled following avulsion of the nerve. On examination of the mouth cavity, the entire mucosa of the left upper jaw was seen to be badly swollen and ragged; highly offensive thick pus came from the alveolus. The bone was palpable. No empyema of the maxillary antrum. The diagnosis was facial phlegmon, due to otitis of superior maxilla, (phlegmonous erysipelas). Deep incisions were applied along the nose and lip, but did not permanently relieve the swelling, which progressed towards the temporal region and towards the inner ocular angle, to the forehead and the other side of the face. The old incisions were extended into the surrounding inflamed tissue, and deep incisions were applied down to the periosteum, through the lower eyelid, in the upper lid, on the forehead, with crenation of this yellow pus under a high pressure. The eyelids again became edematous, opacity of the cornea appeared, and within a week after the last operation, there was panophthalmia of the left eye, with progressive protrusion of the eyeball. The inner ocular angle of the other eye was likewise inflamed and swollen; the right conjunctiva was slightly edematous. Operation was performed in the form of typical evisceration of the eyeball (abscess of vitreous), followed by inspection of the old incisions, which showed that infection led from the cheek deeply into the orbit. Evisceration of the orbit was accordingly added; the orbital contents were found to be interspersed with numerous abscesses also

the retrobulbar fat-tissue. The operative sequelæ were favorable, and the patient remained free from meningitic symptoms. One month later she could be discharged into ambulant treatment.

A review of the literature showed that nearly all cases which begin in this way (infection following extraction of upper incisor teeth) terminated fatally, probably due to the course of the infection. This may travel by several routes, first through local propagation, i. e., continuation of the inflammatory process from the maxillary periosteum to the orbital periosteum; second, through propagation across the soft parts, as in the author's case; third, by metastasis. In the above described patient, the infection was carried through the blood vessels and lymphatics of the buccal mucosa, in the form of an extensive erysipellatous soft parts phlegmon. This mode of infection would seem to be the most dangerous, involving more frequent and rapid possibilities for propagation and meningitic manifestations. Timely radical operation saved the patient's life and the vision of one eye. Although grave complications rarely follow the extraction of teeth, their appearance in a given case, calls unconditionally for the performance of a radical operation, in order to ensure a favorable outcome.

Remote Results in Three Cases of Bone-Graft of the Lower Jaw. Julliard. *Schweizerische Medical Wochenschrift*, 1920, No. 25, p. 492.

The author reports three observations on bone-grafts dating back eighteen months or longer. These operations were performed in Germany, on French prisoners, by experienced surgeons and even by specialists, under the best clinical conditions, but the results serve to show that this method, which by many is considered as the best at our disposal, still leaves much to be desired. Re-examination of three soldiers, 23, 21, and 32 years of age, respectively, at the end of one year and a half to two years, showed that bone grafts of the lower jaw at any rate, do not always permit sufficient guarantees of solidity. Bony apposition is absent; there is no augmentation of the transplanted tissue. The old bone should have disappeared and been replaced by new bone, but at the end of eighteen months and two years, this process had not been terminated in grafts a few centimeters in length. No matter if the graft be supported by an apparatus or exposed to regional stimulation through strain, rarefaction sets in and mobilization takes place at one of its extremities. However, these observations are not yet sufficiently numerous to permit general conclusions unfavorable to bone grafts, and other results, in other regions of the body, must still be waited for. An improvement on bone-grafting may perhaps be found in osteo-periosteal grafts, which yield excellent immediate results, but the remote and permanent results of which still remain to be established. The application of this method is easy, the affected region promptly consolidates, and a resistant mass is formed; the callus is soft at first, but then becomes hard and demonstrable by radiography. The osteo-periosteal graft method has been repeatedly adopted by the author in his recent practice, so far with highly favorable results.

Adenoma of the Velum of the Palate. Portmann. *Bulletins de La Societe Anatomique de Paris*, 1920, No. 2.

Glandular tumors of the palatine velum are among the rarest benign growths met with in this region. The author was recently enabled to observe an

illustrative case in a woman 45 years of age, who had noticed the presence of a small tumor on the right side of the palate, for about five months past. This tumor had progressively enlarged, up to the size of an apricot pit, but without producing important functional disturbances. The growth protruded into the mouth and pharynx, its indistinct borders vanishing in the healthy adjacent tissues. The mucosa was raised, but smooth and fairly even on its surface, without a change in color. There was no glandular enlargement. The tumor was removed under local anesthesia, and proved to be very adherent to the deeper layers. Immediate suture was applied, and normal cicatrization followed. On microscopic examination, the tumor was found to consist of hyperplastic epithelial glandular tissue; it represented a series of acinous glands much richer in secretory culdesacs than seen in the normal structure of the glandular apparatus of the palatine velum. The acini were generally larger than in the normal condition. The connective tissue strands were arranged in a very loose-meshed network, and not extensively developed. Numerous small cells could be seen around the vessels and massed in foci. The tumor accordingly answered the description of a typical adenoma of the velum of the palate. Clinical examination permits no distinct differentiation between adenoma, adenosarcoma, or even sarcoma, although one or the other of these affections may be suggested by the configuration, consistence, or the condition of the mucosa. Histologic examination alone removes all doubts and usually shows the presence of a mixed tumor. A pure adenoma of the palatine velum is of exceptional occurrence, and for this reason the above case is worthy of report.

Premature Caries of Upper Incisors. A. Feil. *La Progress Médical*, 1920, No. 35, p. 382.

Attention is called by the author to a peculiar form of dental caries localized in the upper incisors and first described by Dubreuil-Chambardel, in 1919, on the basis of 44 personal observations. In youthful individuals of either sex, between fourteen and nineteen years of age, the upper jaw becomes the seat of caries involving the four incisor teeth together. Whereas, the remaining denture at first remains entirely healthy, other teeth may be secondarily affected, or dental caries may be acquired through ordinary mouth infection. The incisor caries, if of the dry type and fairly rapidly progressive, terminating at the end of not more than four or five years in neurosis and destruction of this incisor group. In a general way, these teeth are not abnormally developed, presenting the regular number, size, and shape, and are properly inserted. Very often, in a proportion of 80 per cent of the cases, the palatine roof is abnormally high, and in three of the forty-four examined cases, an incipient hare-lip is not a simple coincidence, but plays a predominant part in the genesis of the dental caries. The syndrome of this affection accordingly includes: (1) Caries of the upper incisor teeth. (2) Ogival palate. (3) Incomplete hare-lip. The author contributes two additional observations, on youths of 14 and 22 years of age, respectively, and discusses the pathogenesis of the disease, as due to the persistence of the incisor bone as a distinct bone, and the persistence in adults of an infantile arterial type. The pathogenesis of this condition is closely related to the variations of the superior maxilla, which create a morbid predisposition to disease and degenerative processes.

The Etiology and Treatment of Pyorrhea Alveolaris. Rafidin Ahmed. The Indian Medical Gazette, 1920, xv, No. 7, p. 252.

Pyorrhea alveolaris begins with a local irritation at the gum margin, lowering the resistance of the tissues locally and allowing bacteria to implant themselves therein. If it is not checked the disease spreads further down and dissolves the alveolar process, forming pockets. Finally the tooth becomes loose. Oral endamebæ are not the specific cause of pyorrhea, neither is emetin a specific remedy for the disease. The best results are obtained when a case is treated by a combination of the three following methods: (1) Local surgical treatment by the dentist. (2) General systemic treatment by the physician. (3) Vaccine therapy. This combined treatment is in conformity with the associated etiologic factors, which are local and systemic. The local causes are partly mechanical and partly infectious, the former being those responsible for ordinary gingivitis, usually calculi or tartar deposits. The local infectious causes are the pus-producing bacteria, the chief of which are the pneumococcus in chain or diplo-forms, staphylococcus aureus, streptococcus, and micrococcus catarrhalis. The systemic causes are predisposing rather than exciting causes, such as a lowered general resistance, due to acute infectious diseases, especially pneumonia and typhoid fever. Attention to the hygiene of the mouth is the best prophylaxis against pyorrhea alveolaris. In the presence of the disease itself, all tartar deposits and calculi must be removed; malocclusion corrected, illfitting crowns and plates remedied, and with the aid of the x-ray it must be determined which teeth have lost all bony support; these must be extracted. Vaccine therapy has proved so successful that it is constantly gaining in popularity, and the author has obtained very good results with autogenous vaccines, injecting the vaccine deeply into the upper arm. The interval between the injections should be five days at the beginning and lengthened to ten and fourteen days later on.

Pyorrhea Alveolaris. Real. Journal de Médecine de Paris, 1920, No. 16, p. 323.

The author prefers to designate this disease as chronic alveolodental polyarthrititis, this name possessing the advantage of emphasizing the character of the affection while at the same time pointing out the multiple alveolodental lesions which are usually present from the start. In the course of pyorrhea alveolaris, small submucous abscesses which are described under the name of parulis, not infrequently develop in the vicinity of the neck of the teeth, and their appearance is accompanied by aggravation of the pain, the pericervical mucosa becoming raised by the collection of pus. Aside from the pyorrheal form of the disease, which is the most common, there also occurs a much rarer dry form, which is practically noninfectious. Only the atrophic lesions of the alveolus are present, and these develop progressively, finally causing the teeth to fall out, without pus having been demonstrable at any time in the pericervical region.

The determining cause of alveolodental pyorrhea consists of the numerous microorganisms of the buccal cavity, suspended in the saliva or accumulated at the neck of the teeth in the form of tartaric concretions. However,

the infection does not give rise to the typical lesions of pyorrhea alveolaris unless it encounters the assistance of a variety of general or local predisposing causes, which play an important part in the development of the disease and should therefore always be carefully looked for. The neuroarthritic diathesis represents a very common predisposition and its customary manifestations should always be investigated, such as a tendency to congestion, migraine, ptosis, the various forms of lithiasis, and so forth. Diabetes has often been held responsible, and the development of pyorrhea alveolaris has occasionally revealed an undiscovered diabetes. Bright's disease and syphilis have likewise been noted. Nervous diseases complicated by trophic disturbances, such as tabes and general paralysis, often favor the outset of pyorrhea alveolaris. In certain cases where the lesions affect the upper teeth, the alveolar absorption may be such as to result in alveolo-sinus perforation, constituting a condition which has been described as mal perforans of the mouth. Senility is another predisposing cause. It must be kept in mind that pyorrhea alveolaris is especially a disease of old age and under these conditions merely represents a local manifestation of bodily deterioration are weakening. Aside from these general predisposing causes, certain local predisposing factors must be taken into consideration, such as spongy gums, misplaced teeth, deposits of tartar at the neck of the teeth, etc.

Regarding the process through which the various affections referred to above favor the onset and development of chronic alveolodental polyarthritis, it is probable that the majority of the general predisposing causes primarily determine atrophic lesions of the alveolodental articulation. A more simple explanation is that they permanently upset the normal biologic equilibrium of the buccal cavity, thereby favoring the development of any disease and fostering its tendency to become chronic.

Treatment is especially efficient in the early stage of the disease, and tartaric gingivitis must be carefully checked, especially in predisposed individuals. The interdental spaces must be thoroughly cleaned, by brushing the teeth in the vertical direction instead of transversely, as is usually done. Astringent topical applications may be employed for their favorable effect on the congested gums. Digital massage of the alveolus, and especially of the pericervical zone, is also recommended, to be carried out by the patient himself in the morning and at night. In the stationary stage, the treatment must be conducted by a specialist, its principle indications being the destruction of the pus-foci and absolute fixation of the affected parts. The loosened teeth are held in place by means of various appliances. The general alveolodental infection may be fought by autovaccine therapy or intravenous injections of arsenobenzol.

Ankylosis of the Jaw. H. P. Ritchie. *The Journal-Lancet*, 1920, xl, No. 17, p. 479.

The frequency of this condition is not great, but a number of the cases remain unreported, the possibility of operative repair being apparently not well known in the profession. The occurrence is possible at any time of life, but more usually its inception at least is in the early years of life, about

puberty. Fixation of the jaw in occlusion follows involvement of the temporo-maxillary joint or the contracture of the fascia about the joint, particularly of the muscles, masseter, temporal, or pterygoids; therefore this may be readily considered as articular and extra-articular. The primary cause is divided between infection and traumatism. Dental abscesses are sometimes responsible for infection of this joint. Unilateral involvement seems to be most frequent, although bilateral fixation is noted in a fairly large percentage of cases. Ankylosis of the jaw in youthful individuals will result in a tilting of the lower jaw towards the affected side, producing a characteristic deformity. In the adult, this feature is usually absent, rendering the evidence more or less negative. The diagnosis is more difficult in bilateral fixation, or in those cases where the condition has begun in later life, after the ramus has attained its full growth.

From the surgical viewpoint, there is no chance to obtain a movable joint, or normally to reconstruct it, on account of the shallow shape of the joint and the rather delicate structure of the zygoma. Accordingly, the aim and purpose is to create a false joint either by removal of the head or section of the neck of the ramus. The principle of interposition of fascia reflections on joint surfaces was suggested by J. B. Murphy in the treatment of stiff joints, as presenting the best chance of obtaining permanent motility, and this method is of proved efficiency when applied to ankylosis of the jaw. A flap is turned down from the fascia of the temporal muscle with its base on the zygoma, placed and fixed into the hiatus created by the section of the neck of the ramus. Upon the basis of personal experience in two cases, one with the flap and the other without the flap, the author is inclined to believe that the flap can be dispensed with, which distinctly simplifies the steps of the operation. The incision of the skin may follow almost a straight line, along the external temporal artery, and the neck of the bone may be sectioned, or the head removed in any way selected. In order to avoid recurrences of the condition, after-treatment is imperative, which will prevent the surfaces of the sectioned bone from being apposed in occlusion for any length of time. With this object in view, a rubber gag inserted upon the affected side should be worn during the night, to which the patient becomes readily accustomed. This treatment must be carried on for an arbitrary period of six months.

A Contribution to the Pathology and Treatment of Hypersensitive Dentin.

H. Prinz. *The Australian Journal of Dentistry*, 1920, xxiv, No. 2, p. 35.

Hypersensitive dentin may be defined as a state in which the exposed dentin of a vital tooth is painfully responsive to mechanical, chemical, thermal, or electric irritation. The primary cause must be always attributed to its exposure to an irritant. The author accepts the noninnervation theory of dentin and assumes that hypersensitive dentin denotes a state in which the contents of the dentinal tubules are pathologically altered. This change is brought about by external physicochemical influences which interfere with surface tension, absorption, or imbibition, and diffusion. All three processes are closely allied phenomena. Based upon careful study of its pathology, the author concludes that hypersensitive dentin designates a state of irritation

of the odontoblasts of a vital pulp; this irritation being produced only by external agents or physicochemical processes. The rational principle of treatment should be based on the recognition of its pathologic cause, namely hypertension of the contents of the dentinal tubules. Any method or means which favors the readjustment of the altered colloidal equilibrium and prevents further irritation of the exposed dentin surface is useful for the purpose. Hypersensitive dentin offers good chances for conservative treatment. The applied remedies may be divided into (1) physical and chemical procedures (keen edged instruments and caustics); (2) local and general remedies (local anesthetics and sedatives, general anesthetics, and sedatives). Indirectly, hyperesthesia of dentin may be completely eliminated by locally blocking the sensory nerve fibers leading to the pulp of the respective tooth. On an average most satisfactory results in a single tooth are obtained by using the pericemental injection provided the pericementum is sound.

Perfect Dentition in Old Age. J. C. Butcher. *The Lancet*, London, 1920, i, 1111.

The author contributes two interesting photographs from casts taken of the mouth of a woman aged eighty-four years; with the comment that in his experience this condition is unique. All the teeth with a single exception are not only present, but strong and extremely well formed, more than efficient for the need of a person of such advanced age. The missing molar VII was removed by the author about two years ago, under nitrous-oxide, when the patient was eighty-two years old. Two or three of the superior incisors have been filled on the labial surface, and one or two other fillings can be seen in the photographs. She is very moderate in diet, and both parents are said to have had exceptionally good teeth.

A Tooth in the Maxillary Antrum. Hahn. *Zahntechnische Reform*. 1920, No. 34, p. 337.

The following case of antral disease presented several features of unusual medico-legal interest. A large left-sided upper molar tooth broke into two parts during an attempt at extraction, one part with two roots, which was removed, the other with one root which was left behind. The patient, a young woman, failed to return for further treatment, and later on consulted another dentist who injected novocain and tried to remove the remaining fragment. But the root was pushed through the thin wall of the maxillary antrum and slipped into the cavity. According to the patient's statement, the fragment disappeared from the alveolus after the attempted extraction, and two days later, pus exuded from an opening in the maxilla, through which the tooth had vanished into the antrum. Subsequent examination by the author showed the existence of a fistula leading from the alveolus to the maxillary antrum, as well as the presence of the fragment within the cavity. Through the entrance avenue created at the time of the unsuccessful attempt at extraction, pus-producing germs (staphylococci and streptococci) had penetrated into the mucosa of the maxillary antrum and suppuration had become established on the left side. For the removal of this suppuration, the performance of the radical operation according to Caldwell-Luc was recommended, in order to

extract at the same time the dental fragment from the maxillary antrum, and the operation was performed under local anesthesia. After the cavity had been widely opened, the fragment was removed by way of the canine fossa from where it lay loose in the antrum, surrounded by masses of polyps and thickened mucous membranes. The cavity was scraped, the bony wound-margins were trimmed, drainage was applied through the inferior nasal meatus, and finally the antrum was loosely packed. Uninterrupted wound-repair followed and the patient made a good recovery. The case was one of maxillary sinus suppuration due to luxation of a diseased dental root into a previously healthy maxillary antrum.

The Temporary Teeth: Disorders Due to Their Neglect. J. Ross Snyder.

Paper read at Seventy-first Annual Session of American Medical Association, New Orleans, April, 1920.

The care of the child's teeth is a subject that until recently was ignored by the pediatricist and neglected by the dentist. The majority of dentists have neither the time nor the inclination to treat temporary teeth. The early care of the child's teeth is a matter in which the pediatricist should assume greater responsibility. It has been estimated in New York that 98 per cent of all teeth are perfect when they emerge from the gums and that by the time the children reach the first grade in school 98 per cent of them have bad teeth, and one-third have abscess conditions. Equally bad conditions have been revealed by the inspection of the mouth of school children elsewhere. Clean and properly prepared food, when it passes through a neglected mouth may become infected and give rise to gastrointestinal disturbances. In the presence of an unclean mouth, infection occurs more easily. The premature loss of the deciduous teeth is the most frequent cause of malocclusion and deformities of the face and jaws. There is great need in every community of education as to the need of early dental hygiene and prophylaxis. The education of the parents in this matter cannot be left to the dentist, but is a responsibility which the physician, and more particularly the pediatrician, should assume. Pedodontia is still in its infancy but merits culture and development.

Focal Infections and Tissue Specificities. G. McConnell. *The Journal of the National Dental Association*, 1920, vii, No. 9, p. 806.

The occurrence of focal infections depends on an invasion by bacteria, with subsequent inflammatory reactions. To all intents and purposes, the presence of a focal infection means the formation of a small abscess that has been encapsulated to a varying degree. Such lesions may be found in various parts of the body, but it would seem that the most common site is around the apices of the teeth. As long as it remains isolated, the danger from such an area is comparatively slight. In regard to the causation of focal infections about the roots of teeth, it is highly probable that the infection originates in the tissues in or about the teeth. In those cases in which extensive cavity formation has taken place, so that the pulp has been exposed, it is very easy to realize how readily the inflammation can extend. It is not necessary that the canal be

completely exposed, as after about one-half of the dentin has been destroyed, the larger part of the dentinal tubules are open and there is little to interfere with the passage of the bacteria. There are, however, many instances where apparently there is no lesion in the tooth to account for the infection. The anatomic arrangement of the tooth and its surrounding structures is suggestive. From the apical vein are given off branches which extend along the peridental membrane close to the gum margin. The pathogenic organisms, which are constantly present in the mouth, may accordingly penetrate the veins and give rise to partial thrombosis, the coagulation continuing to extend along the vessel, with a tendency to cause inflammation in the surrounding tissue. In many teeth there are multiple foramina to be found at different levels. In cases of pyorrhea where a large part of the tooth is exposed as a result of absorption of the interdental portions of the alveolar process, the bacteria can readily gain entrance and propagate the infection. The inflammation of the peridental membrane, which is the vascular structure involved primarily, promptly affects the neighboring bone-tissue. This tissue appears to have very little resistance, it breaks down and becomes absorbed, leaving a definite cavity containing purulent material. This process may continue and finally make an exit in any one of many directions, or it may remain distinctly localized. In order that it may be rendered harmless, the cells of the peridental membrane are seen to undergo multiplication with the formation of connective tissue, culminating in the formation of a distinct capsule. Examination of the alveolar process around such areas at times shows a distinct condensation of the bone that is in immediate contact with the inflammatory portion; giving in its turn an extra barrier to the extension of the process. A break somewhere of the protective formations may permit the bacteria to enter the lymphatics and eventually make their way into the circulation. In this way, pathogenic microorganisms may be carried to distant parts of the body, where they become lodged and set up inflammations of varying severity. Not all parts of the body seem to be equally susceptible to injury, however, the greatest number of secondary lesions, probably being found in connection with the joints. Endocarditis, or rather a restricted inflammation of the valvular portion, is not uncommonly referable to a focal infection of dental origin. Iritis in numerous instances is due to localized abscesses about the teeth and is relieved by the removal of the diseased tooth. Focal inflammations commonly are caused by the streptococcus viridans, and this same organism can give rise to systemic infections. The author emphasizes in conclusion that every practitioner who makes the diagnosis of an apical abscess must remember that this condition has the potential power of causing very serious trouble, although this may not necessarily result in all of the cases. Dental films require a skilled and experienced roentgenologist for their correct interpretation.

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EDITORIALS

Defective Teeth Among School Children

THE condition of the teeth of school children has received considerable attention during the last few years and various attempts have been made to obtain statistics on unhealthy teeth. A report published by Dr. Royal S. Copland, Health Commissioner of New York City, contains some facts relative to school children that can hardly be passed without comment. Dr. Copland has made a comparison of the physical defects of school children based on conditions as found in 1909 and 1919. The report as published in the *New York Times* does not state the number of children examined or in what part of the city the examinations were made, but we presume it was a composite report covering examinations made over the entire city of New York. Not only were the teeth examined, but other physical defects were noted. A comparison of these defects as found in 1909 and 1919 is quite interesting.

The report covers ten physical defects, seven of which show a decrease over the ten years between 1909 and 1919. The only three that show an increase are malnutrition, cardiac defects, and defective teeth. Beginning with defective vision, we notice a 6 per cent reduction in the two tabulations. Defective hearing in 1909 was 1.0 per cent; in 1919, 0.5 per cent, which would be half as many with defective hearing in 1919 as were found in 1909. Defective nasal breathing also fell from 18.1 per cent to 11.6 per cent; hypertrophied tonsils, from 22.0 per cent to 15.3 per cent. When we come to malnutrition we notice in 1909, 3.1 per cent in 1919, 19.9 per cent. This means that where one child was found suffering from malnutrition in 1909, six were found in 1919, or an increase of 600 per cent in ten years. This ratio is entirely too great, and we can find no reason for it. We wonder whether some of the difference is not the result of a more careful examination made at the present time than was made in 1909. It has only been comparatively few years that the medical profession has made the careful examination for malnutrition that it now made, and it is very probable that an increase in number is the result of improved examination methods. Cardiac disease also shows an increase from 0.65 per cent in 1909 to 1.5 per cent in 1919. This increase should be more if malnutrition actually increased as much as the report shows. Pulmonary diseases show a slight decrease over the ten-year period, which also is strange if malnutrition has increased, for it is a well-known fact that pulmonary diseases always increase as malnutrition becomes greater.

When we come to defective teeth, we find 57.0 per cent in 1909 and 62.3 per cent in 1919. This increase in ten years we think is also the result of a more careful examination than was made in 1909. If there has been an actual increase in malnutrition, we would expect to note an increase in defective teeth. However, in the face of other conditions as tabulated, we are inclined to doubt an actual increase as extending over a period of ten years. Until there are other reports turned in, we are inclined to believe the increase of dental defects from 1909 to 1919 has been the result of more careful examinations and not an increase in pathologic conditions.

St. Louis University Centennial Endowment Fund

FOR the first time in more than a century of endeavor, St. Louis University, which established the first school of dentistry west of the Mississippi River and which operates the only school of Class "A" rating in Missouri, has made a public appeal for funds, to be used largely for the expansion and support of its dental and medical departments. The university has asked its alumni and friends to raise the sum of \$3,000,000, the income from one half of which is to be used to pay the teaching staff of the Dental and Medical Colleges. New buildings and clinics for the dental and medical branches will cost \$550,000 and the remainder will be used for extension work of the Institute of Law, School of Commerce and Finance, and College of Arts and Sciences.

The money asked for will be known as the Centennial Endowment Fund, although the 100th anniversary of the institution occurred during the war,

when more than 3000 of the faculty, alumni and undergraduates were under arms, the College of Dentistry, in the three classifications, being represented by 374 men.

As an outgrowth of this activity and because of a recent ruling of the War Department that in future all vacancies in the Dental Corps of the United States Army will be filled by graduates of Dental Colleges having a Reserve Officers Training Corps, such a unit now has been organized at the St. Louis University Dental School, with Major Robert W. Kerr, Medical Corps, U. S. Army, detailed by the Government as the Professor of Military Science and Tactics. Under the law there will be but ten such dental college units of the R. O. T. C. in the entire United States.

As the purpose of the Endowment Fund is largely to keep the Dental School up to the high standard which caused it to be selected by the Government as one of these ten honor schools, the university asks the graduates of the College of Dentistry, now scattered all over the earth, to constitute themselves committees of one to assist in the realization of the fund.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The next meeting of the American Society of Orthodontists will be held at the Ambassador Hotel in Atlantic City, N. J., on April 27, 28, 29, and 30, 1921. An invitation is extended to all who are interested in orthodontia.—J. Lowe Young, D.D.S., President. Ralph Waldron, D.D.S., Sec.-Treas.

Alumni Society of the Dewey School of Orthodontia

The next Annual Meeting of the Alumni Society of the Dewey School of Orthodontia will be held on April 25 and 26 at the Hotel Ambassador in Atlantic City, N. J. Clinics and evening sessions will be included in the program. All interested in orthodontia are cordially invited to attend these meetings.—George F. Burke, Sec., 741-43 David Whitney Bldg., Detroit, Mich.

Kentucky State Dental Association

The next Annual Meeting of the Kentucky State Dental Association will be held in Louisville, Ky., April 13-16, 1921, Seelbach Hotel as Headquarters. A clinical program of unusual interest is being arranged. Address all correspondence to W. M. Randall, Sec., Louisville, Ky.

Odontological Society of Western Pennsylvania

On April 12 and 13 the Odontological Society of Western Pennsylvania will hold its Fortieth Annual Spring Meeting at the William Penn Hotel, Pittsburgh, Pa.

Tennessee State Dental Association

The Fifty-fourth Annual Meeting of the Tennessee State Dental Association will be held at Nashville, Tenn., May 17, 18, 19, 20, 1921.—J. J. Vaughn, D.D.S., Chairman Publicity Committee.

The Pacific Coast Society of Orthodontists

The Annual Meeting of the Pacific Coast Society of Orthodontists will be held at the Hotel Portland, Portland, Oregon, February 16, 17, and 18, 1921—Dr. H. L. Morehouse, President. Dr. Carl O. Engstrom, Sec.-Treas.

First Class in Military Dentistry

The first class in Military Dentistry ever held in the United States was conducted in the Dental College of St. Louis University yesterday by Major Robert W. Kerr, U. S. Medical Corps. Major Kerr explained to the 171 sophomores and freshmen who constitute the R. O. T. C. of St. Louis "U" that while similar classes would be established in nine other class "A" dental schools of the United States, the St. Louis University unit is the only one now fully organized.

According to Major Kerr, the course will take four years, including plastic surgery and the treatment of gunshot wounds of the jaw and face. At the conclusion of the course each graduate of the St. Louis University College of Dentistry will receive a commission as a 1st Lieutenant in the Dental Reserve Corps of the United States Army, and all regular officers of the Dental Corps will in future be drawn from this reserve.

The St. Louis Study Club

The St. Louis Study Club announces its third annual midwinter clinic, to be held in St. Louis at the American Hotel Annex on January 15, 1921, from 2 to 5 P. M. At this clinic will be shown the results of the work accomplished during the session just closing. Following the clinic and at 6:30 a dinner will be given in honor of the instructors. All ethical dentists are invited to attend.

Notes of Interest

Dr. Walter G. Hutchison announces the opening of his dental offices, 1521 Main Street, Columbia, South Carolina. Practice limited to x-ray, pyorrhea, exodontia and surgery.

Dr. J. Lowe Young announces the removal of his office to 18 West 74th Street, New York. Orthodontia exclusively.

Monsieur Ernest Bonifas, Conseiller à la Cour di Appel, and Madame Ernest Bonifas announce the marriage of their daughter, Mademoiselle Elisabeth Bonifas to Docteur James Quintero, Lyon, France, December 28, 1920.

Mrs. Loretta Pilkington Walters announces the marriage of her daughter Mary Virginia to Dr. Edmond Beauregard Arnold on Wednesday, December 29th, 1920, St. Louis, Mo.

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No. 2

ORIGINAL ARTICLES

PRIMARY LINES OF FORCE OF THE PERMANENT TOOTH*

BY CARL O. ENGSTROM, D.D.S., SACRAMENTO, CAL.

BY PRIMARY lines of force is meant the lines of first importance. They are considered as principal and fundamental lines peculiar to the individual tooth. In this presentation they must needs be elementary. The definition of force is that which changes or tends to change the relative condition as to rest or motion between two bodies. In this article two factors in the function of the teeth are dealt with, to-wit, force and tooth. To emphasize the identity of each and their equal importance, reference is made to a recent article wherein definitions of orthodontia are given; one as the "correction of malocclusion" and the other as "that which treats of forces controlling the form of the dental arch." One lays stress on position, the other on force. It is evident neither force nor form can be considered alone, but both are indispensable in the function of the teeth. In the mind of the writer, orthodontia is the science which treats of function in relation with the position of teeth. Instead of malocclusion, we refer to lost or disturbed function; and instead of correction, we refer to improved function. In improved function we have greater efficiency and in greatest efficiency, beautiful form and beautiful expression.

While the lines of force herein explained represent but a few of all in occlusion, they are of considerable importance in regard to the position of teeth. In the study of the position of teeth the lines of force are ascertained by the relative position of the teeth and their individual forms. Up to the present time this is a knowledge based mostly on experience and observation in treatment of cases. There is little data dealing with this subject, yet these lines of force are most potent factors in the maintenance of the tooth in proper equilibrium. The preservation of the health of the surrounding tissues depends to a very great extent on the proper delivery of force to it.

*Read at Annual Meeting of the Pacific Coast Society of Orthodontists, San Francisco, Feb. 16-17-18, 1920.

A knowledge of forms of parts is imperative to a proper understanding of this subject. The form of the tooth, crown and root, and the structure of the supporting tissues are such that force applied to the crown of a tooth in the natural and most effective manner shall be opposed by forces of supporting tissues, likewise of special design, conforming to such demands. The form of the root being unchangeable, there is only one position for it to occupy in proper function, reference being hereby made to Angle's "Line of Occlusion." Herein is a fundamental principle in the study of all dental operations. The human denture is composed of teeth designed for a varied usage, and accordingly the individual tooth presents many forms. In form and function no two teeth of an entire denture are exactly alike. Each tooth has an identity of its own. It must be borne in mind that the tooth is but a part of a great machine, a machine of itself, as dependent on other parts as the whole is on its parts. We will consider the tooth apart from its neighbors, and study it as a unit of itself. The single tooth is not to be thought of as an inert mass inserted in inert matter but a living part of a living body, a part used principally in the mastication of food, with lines and surfaces receiving and transmitting force in a variety of directions. Strictly speaking there is no such thing as a stationary tooth in the living being. Forces are continually at work causing movement of all parts of the body, and the tooth is no exception. The position of equilibrium of a tooth may be said to express the forces acting upon it.

Interest is to be confined to a study of directional forces, lines and surfaces of the permanent tooth in normal function, taking for description teeth not belonging to a particular type, but those described and illustrated in text books on dental anatomy. The purpose is to include such data that a more specific description of forces and a better understanding of the resolution of forces may be had, or in other words that more basic principles be formulated from which to make deductions.

In the study of lines and surfaces of the human teeth practically no straight lines are to be found. Therefore a strictly accurate description regarding their part in the promotion of force is beyond the intent of this article. But bear in mind force travels in a straight line (Newton's first law). Is it not a fact that in practice we consider inclines as without curvature? The specific direction of force will vary according to the variation in form of the tooth. A liberal interpretation will necessarily have to be made of that which is to follow and for ease and clarity straight geometric forms replacing the curvatures will be used. It will be necessary to introduce a few new terms to properly present the subject.

The position that this subject bears to general physics is quite obvious. However, that a clear understanding may be had, it may be best to start with the terms and definitions in physics applicable to our subject. Of the various subdivisions of general physics, our subject is included in mechanics, which treats of motions of bodies and the causes of changes in these motions.

Force is whatever changes or tends to change the motion of a body, or that which produces acceleration. The same thought is conveyed by the definition given in the first part of this article but given again for emphasis.

There are two kinds of motion, translation and rotation, the former when

every straight line in the body remains parallel to its original position and the latter when all points in the body travel in circles the centers of which lie in a straight line; this line is called the axis of rotation.

A point or body is said to have one degree of freedom when its motion is confined to a definite line; two degrees of freedom when confined to a definite surface, and three degrees of freedom when not restricted in any way. Note the structure of the tooth, its root and surrounding parts and it will be observed that the tooth has freedom in either of the three degrees. The conic root seated in the conic socket, or alveolus, allows for this.

A force is always accompanied by a counterforce or, we may say forces act in pairs.

When two equal and opposite forces act on a body they are in equilibrium.

It may be well to bear in mind Newton's three laws of motion as they will be used throughout our study.

First Law.—Every body persists in its state of rest or of uniform motion in a straight line unless it is compelled by some force to change that state.

Second Law.—The rate of change of the momentum of a body is in proportion to the force acting on the body and is in the direction of the force.

Third Law.—Action and reaction are equal and opposite.

Force is completely defined when its magnitude, its direction, and the point at which it is applied are given.

The resultant of two forces is defined as that single force which will produce the same effect upon a body as is produced by the joint action of the two forces.

The resultant of two similarly directed forces is equal to the sum of the two forces.

The resultant of two oppositely directed forces applied at the same point is equal to the difference between them, and its direction is that of the greater force.

The resultant of two equal and opposing forces is zero. Two equal and opposite forces not in the same line constitute a *couple*.

The equilibrant of a force or forces is that single force which will just prevent the motion which the given forces tend to produce. It is equal and opposite to the resultant.

The component of a force in a given direction is the effective value of the force in that direction. Whenever a force acts upon a body in some direction other than that in which the body is free to move, it is clear that the full effect of the force is spent in two directions, both of which forces are components of the single force. To ascertain the components of a force delivered to an inclined plane we may use the parallelogram method of resolution of force. (Fig. 1.) Let *AB* represent an inclined plane and *CD* force applied. The force applied is free to move in the direction of *B*. Hence *DE* represents the one component of *CD*. Using the force *DH* as the diagonal, a parallelogram *DEHG* is drawn—the side of the parallelogram *DG* represents the other component of *CD*, or the force spent at *D* in the direction *DG* first mentioned as the direction in which the force was not free to move.

Functional movement of the tooth in its alveolus is allowed by the periodontal membrane. Be it understood that the tooth is in equilibrium and changes

of the supporting tissues and position of the tooth occur in consequence of the change of equilibrium of the forces acting upon the tooth. Mechanical force by an orthodontic appliance will change the position of equilibrium with result just mentioned. This constitutes in part orthodontic treatment.

Force transmitted by maxillary bones and by muscles in occlusion produces a stress represented in the teeth. Referring to the one jaw, force from the maxillary bone to the root of the tooth will be referred to as maxillary force and that in the opposite direction, crown toward root, occlusal force. These forces produce movement of the tooth in a maxillary direction and in an occlusal direction. These distinctions appear more applicable than up and down or elevation and depression. As force is always accompanied by counterforce, maxillary forces are the equivalents of occlusal forces or vice versa. The direct line of force between these two points using the central line of the upper central incisor tooth or center line of mass will be referred to as the *principal line of force*.

It may be noted that two like and opposite subsidiary lines of force produce the principal line of force. Coincident lines of force are the component lines of primary lines of force, which produce movement of the tooth in other than in

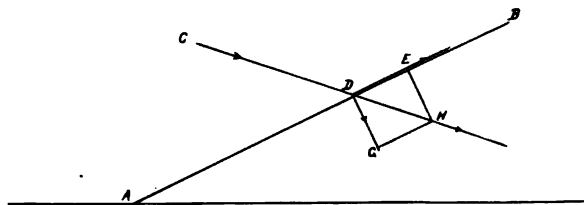


Fig. 1

line with the primary line of force. Hence we have primary lines of force and primary movement, coincident lines of force and coincident movement.

Particular emphasis may be placed on the principal line of force and much may be written in regard to it. It is the one line of force that is maintained in increasing degrees of usefulness throughout the various stages of life of the tooth. In this connection it is apparently as important that occlusal surfaces of teeth be maintained as nature provides with years of use, as that cusps with their inclined planes be not destroyed in young dentures. It may be observed that opposite subsidiary forces inclined toward each other, applied to the crown of the tooth are resolved in the direction of this line. By repetition it may be emphasized that all dental operations by restoration of part or all of the crown of the tooth involve a consideration of this line of force particularly. Also, full artificial dentures constructed with teeth of such a form and in such positions as to transmit force in conformity with the principle of this line of force, will possess greater efficiency than where this line is disregarded. And furthermore, the principal line of force in particular is an important factor in the study of the diseases of the investing membranes of the tooth. Aside from the principal line of force, all other lines of force may be called subsidiary, and are the lines which, acting singly and when coming in contact with the crown of the tooth, disturb the equilibrium of the principal line of force.

UPPER CENTRAL INCISOR

We will consider the upper central incisor from three aspects, mesial, labial, and occlusal or incisal. In order to present vividly the primary lines of force, a separate drawing is made of each view, also a drawing for each line of force. Bear in mind we do not consider magnitude but only direction of line of force. The occlusal and primary lines of force of the upper central incisor that are presented as directed vertically and horizontally are as follows:

Primary Lines of Force of the Mesial Aspect.

1. Principal line of force.
2. Vertical line of force to inclined plane.
3. Horizontal line of force.
4. Horizontal line of force to inclined plane.

Primary Lines of Force of the Labial Aspect.

5. Vertical line of force, mesial or distal, of principal line of force.
6. Vertical line of force to incline formed by junction of incisal and distal surfaces.

Primary Lines of Force of the Occlusal Aspect.

7. Horizontal line of force, mesial or distal of the principal line of force.
8. Horizontal line of force to incline mesial or distal of the principal line.

MESIAL ASPECT OF UPPER CENTRAL INCISOR

Referring to the mesial aspect, the upper central incisor is described as follows: "The root is conic in form, its base directed downward, its apex upward. The general form of the crown is that of a double inclined plane, or wedge-shape, the cutting edge representing the junction of the two sides of the incline, one of which looks anteriorly (labial) and the other posteriorly (lingual). The base of the wedge is directed upward and partakes of the contour of the neck of the tooth."

Using the outline as described of the upper central incisor as in Fig. 2 and superimposing two isosceles triangles, one for the root of the tooth *ABC* and one for the crown *ACD*, each having the same base at the neck of the tooth, the sides represent diagrammatically the general form of the tooth from mesial or distal aspect, and for our purpose this will be considered as representing a cross section of the tooth midway between the mesial and distal surfaces.

As the area of *ABCD* represents the body of the tooth and as heretofore mentioned transmits force from the occlusal to the maxillary or vice versa, it is necessary that parallel inclines *EF* and *GF* representing the cross section of the alveolus be drawn also. Be it remembered that maxillary forces are the equilibrants of occlusal forces.

(1) *Principal Line of Force.*—Using the aforementioned outline and drawing a line from the apex of one triangle to the other *BD* (Fig. 3) both triangles are bisected. This line, as has already been mentioned, represents the principal line of force and also the line of movement of the tooth vertically. Force in the direction of *HD* applied to the angle at *D* will cause a vertical

translation of the tooth in that direction, a primary movement vertical and maxillary. As in translation all lines of force move in parallel lines, we will draw two lines MK and LJ to represent lines of force directed to incline EF and GF . However, as the entire body of the tooth transmits force to these maxillary inclines, similar lines directed to any point along the inclines might be used. Force MK is resolved into two component forces, one in the direction of F and one in the direction of K' . The lines JJ' and JF represent the component forces of the line LJ . The maxillary equilibrants may be represented by $F'F$, for the line of force HF and for the resultant of the components JF and

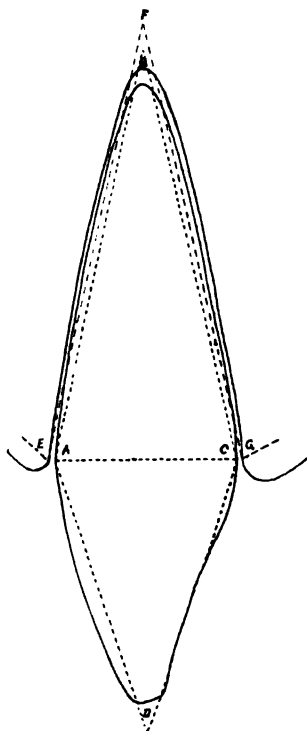


Fig. 2

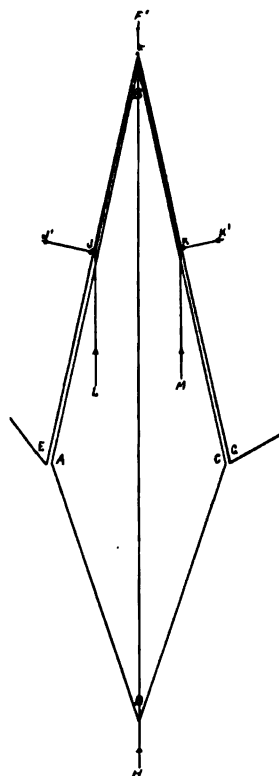


Fig. 3

KF . The maxillary equilibrants of the component lines of force striking the maxillary inclines may be represented by the lines $J'J$ and $K'K$. The translation of the tooth is vertical and in a maxillary direction. Herein is primary movement and no coincident movement.

(2) *Vertical Line of Force to Inclined Plane.*—The primary line of force HL (Fig. 4) parallel to the principal line of force directed to the incline DC is resolved at L into components, one LP in the direction of P and one LO in the direction of O .

It is evident that force in the direction of O will produce rotation of the tooth with an axis represented by a center of attachment at B . Primary movement of the tooth is in the direction of the primary line of force HL , vertical and maxillary. The coincident movement is in line with LO . However, the com-

ponent LO may be projected to the incline EF as at O and here resolved into two components, one on the incline in the direction of F and one in the direction of P . Motion of the tooth occurs primarily in a maxillary direction and incidentally labially or lingually. The maxillary equilibrants are represented by the lines $F'F$ and PO . If a primary line of force M be directed to the other incline DA , equidistant with force (HL) from the principal line of force, and supposing both inclines to be alike it will become resolved into components as above described. If it be made to act with the other force H , the components meeting at O effect a resultant represented by the principal line of force. In this

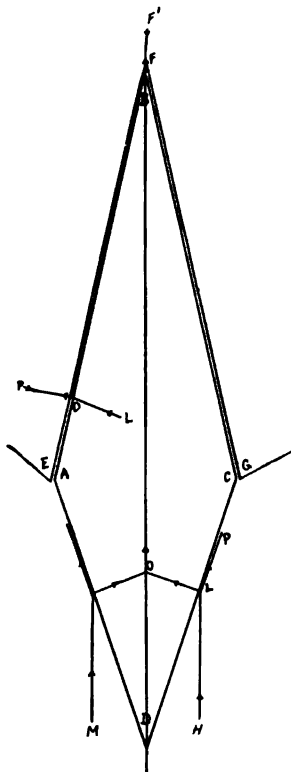


Fig. 4

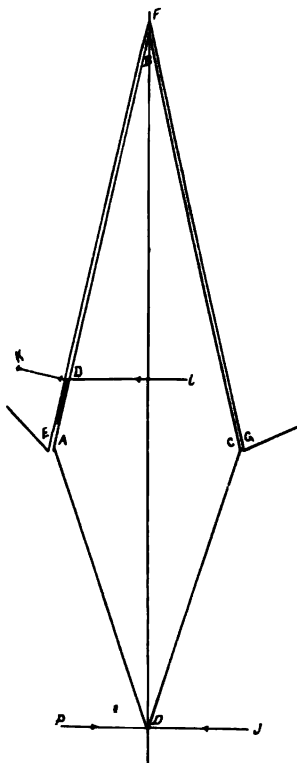


Fig. 5

latter case the primary movement of the tooth is vertical as in the description of the line of force preceding and no coincident movement is effected.

(3) *Horizontal Line of Force.*—A primary line of force JD (Fig. 5) directed at right angles to the principal line will cause rotation of the tooth with the axis at B . Hence primary movement is facial or lingual. The line of force LD projected to incline EF is resolved into components, one in the direction of E , and the other in the direction of K . The maxillary equilibrant is represented by the line KD . The consequent primary movement of the tooth is one of rotation with an axis as at B lingually or labially. The tooth is rotated with an occlusal translation effecting a coincident movement occlusally. It is obvious that a like force in the opposite direction to JD as PD will produce a resultant of zero or no movement.

(4) *Horizontal Line of Force to Incline.*—The primary line of force HJ (Fig. 6) directed at right angles to the principal line of force and to the incline CD is resolved into components, one in the direction of D as JK and one in the direction of L . This component force JL projected to incline FE is resolved into components LM and LN . The maxillary equilibrant of LN is represented by line NL . It will herein be noticed that motion of the tooth is produced primarily labially or lingually by rotation at B and coincidentally in a maxillary direction. A concomitant and similar force OP to the incline AD opposite to HJ will result in no primary movement of the tooth but in a coincident movement

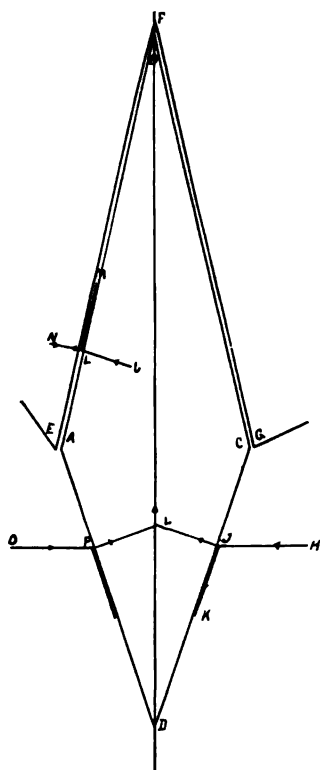


Fig. 6

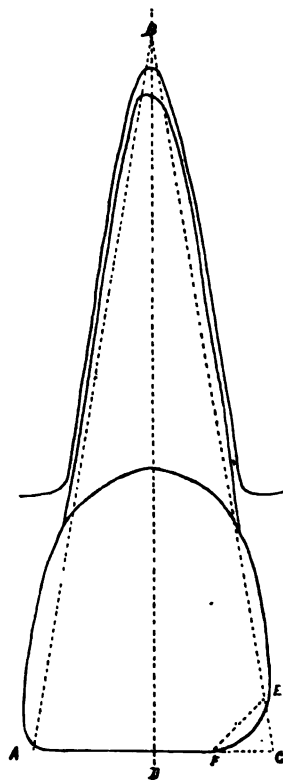


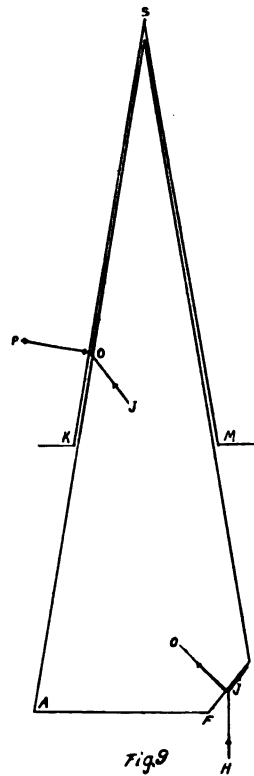
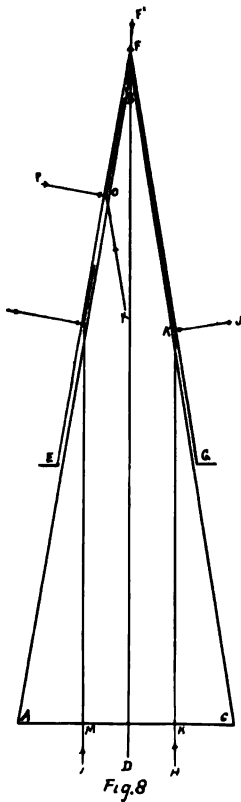
Fig. 7

in a maxillary direction by effecting a resultant at L represented by the principal line of force DB .

LABIAL ASPECT OF THE UPPER CENTRAL INCISOR

The labial surface of the crown of the upper central incisor is described as resembling an imperfect quadrilateral. The root as before mentioned is conic in form, hence an isosceles triangle ABC may be superimposed over the outline of the central incisor as in Fig. 7. A line bisecting this triangle as BD is used to represent the principal line of force of the labial aspect. Maxillary inclines EF and GF are shown in Fig. 8. It will be noted the distal incisor angle is represented by a line EF which will be referred to later.

(5) *Vertical Line of Force Mesial or Distal of the Principal Line of Force.*—A primary line of force HK (Fig. 8) parallel to the principal line of force and striking the line AC representing the incisal edge of the tooth as at K , is directed to the maxillary incline GF . Slight rotation is effected by this line of force being to one side of the principal line DB causing a resolution of the line of force on the incline FG , into components, one in the direction represented by lines KJ and one in the direction of F . Resultant movement of the tooth is in the direction of F and the opposite incline EF . The resolution of the component force KF is shown on the incline EF as at O , one component in the direction of P and one in the direction of F . The equilibrants are represented by JK , $F'F$ and PO . Primary movement due to this force HK is in a maxillary direction with coincident movement of rotation. A line of force repre-



sented by the line IM , directed to an equal distant point as that of HK , from the principal line and on the line AC is resolved into components similar to those of HK . The combined action of the two forces HK and IM is that of a primary vertical translation in a maxillary direction. In this case there is no coincident movement.

(6) *The Vertical Line of Force to Inclined Plane of Distal Incisal Angle.*—It is believed force delivered to incline FE (Fig. 9), in fact representing a rounded surface, so much more rounded as compared with mesial incisal angle, is of such significance as to be worthy of consideration. Such a form apparently is of value in the movement of eruption, in maintaining approximal con-

tact, and in conjunction with a like force of the other central incisor, it is of value in the equilibrium of the tooth. It may be observed that the effect of this line of force is similar in resolution to that described under the heading of primary line of force (No. 2). Line of force *HJ* is resolved into components, one in the direction of *E*, and one in the direction of *O*. The effect of the movement of the tooth in the direction of *O* on the inclined plane *KS* is a resolution of that force represented by the line *JO* into its components, one in the direction of *S* and one in the direction of *P* as the line *OP*. The primary effect of this force *HJ* is primary movement vertically and in a maxillary direction with coincident movement mesially.

THE OCCLUSAL ASPECT OF THE UPPER CENTRAL INCISOR

This view presents for our consideration a root whose outline is described as that of "a rounded triangle, one side of which faces a labial, one in a mesio-lingual and one in a disto-lingual direction. This triangular outline usually

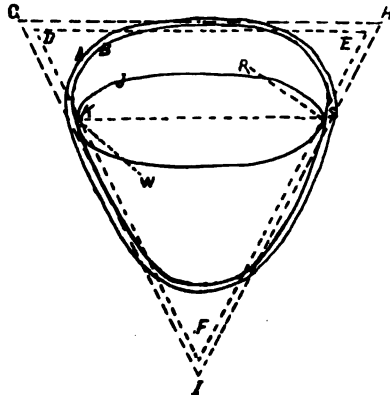


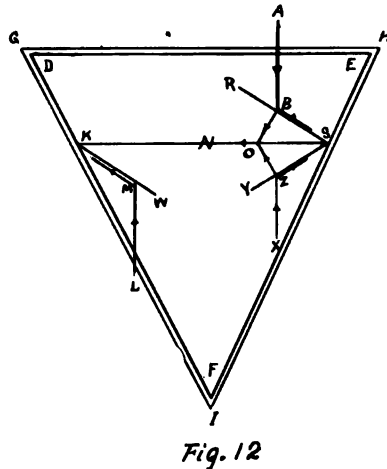
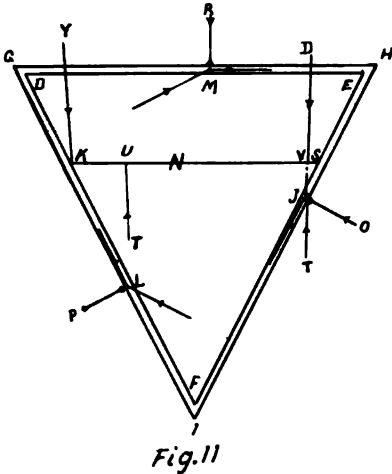
Fig. 10.

continues throughout the entire length of the root." Using the above description for the outline as in (Fig. 10) *B* represents the root; *A*, the alveolus; and *J* an outline of a cross section about midway between the incisal edge of the crown of the tooth and base of the root. We will superimpose a triangle *DEF* for the root and *GHI* for the alveolus. Line *KS* is drawn about midway between labial and lingual surfaces of the crown of the tooth. The line *RS* is used to represent an incline mesial or distal of the principal line.

(7) *Horizontal Line of Force Mesial or Distal of the Principal Line.*—The primary line of force represented by line *DV* in (Fig. 11) coming in contact with the line *KS* distally of the principal line which is represented by *N*, effects a rotation on the axis *N*. This force projected may be resolved into components as at *JL* and *M*. The force *D* projected to *J* on the incline *HI* is resolved into components, one in the direction of *I* and one in the direction of *O*. Resolution of lines of force are shown at *L* and *M*. From the above aspect primary movement is that of rotation with coincident movement as in this case lingually and to the opposite side mesially. This line of force should not be confounded with lines described as number 3 and 4. Force *TU* parallel to

force *DS* but in opposite direction will form what is called a couple. The couple effects simply rotation. This primary line of force in conjunction with an opposite line *TV* effects no primary movement of rotation. Primary line of force *YK* equidistant with the line *DS* from *N* effects in unison primary movement of the crown of the tooth lingually in this case with no coincident movement.

(8) *Horizontal Line of Force to Incline Mesial or Distal of the Principal Line.*—In Fig. 12 the line *RS* is used to represent the incline as viewed from the occlusal aspect. The primary line of force *AB* is resolved into components, one in the direction of *S* and one in the direction of *O*. While the primary movement is one of rotation, the coincident movements of the crown of the tooth are mesial and lingual, or in a distal and lingual direction if it be mesial to the axis of rotation. This line of force, if projected to the incline *HI*, may be resolved into components as in the description of the line preceding. Line of force *LM* on the incline *WK* and in the opposite direction of *AB* forms a



couple with primary movement of rotation of the tooth. Line of force XZ opposite to the line AB effects coincident movement of the crown of the tooth in this case mesially.

In conclusion it may be said that it was deemed expedient to curtail description as much as possible in order not to be confusing and hence certain omissions have been made. The coaction of forces make a description and comprehension of each isolated force difficult, and combinations of different primary forces have for reasons set forth not been mentioned. However, an outline of primary lines of force, such as illustrated here in the case of the upper central incisor, furnishes fundamental principles on a more comprehensive scale than those heretofore described in the occlusal relations of the teeth. Functional improvement being our aim in practice, function is the basis for treatment. In the proper conception of function, lines of force such as these that have been mentioned, as well as those that are to follow, would have their proper relation neither exaggerated nor minimized among all other lines of force effective in the promotion of the position of teeth. The application of a

similar systematic arrangement of primary lines of force may be followed in the description of the other teeth of the dental apparatus with such changes as the individual tooth may warrant. This requires further elucidation of the subject.

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ORTHODONTICS, A STUDY IN SIX DIMENSIONS*

By G. G. CAMPION, L.D.S.

PROVISIONALLY and at the moment I define orthodontics as:

The study of the normal relations of the dental arches in themselves and in their relation to a normal facial configuration; the study also of the nature and causation of abnormalities and the means of correcting them so as to restore as far as possible normal relations to the arches and a normal configuration to the face.

Definitions such as this have at times their uses, but with the ever widening circle of our knowledge they become in time antiquated and are then relegated to that dim twilight land the land of the ineffective and the obsolete.

Each of the two parts of the masticating mechanism which we call the dental arches consists of sixteen minor elements, each of which may vary within wide limits from their normal relations to one another, and logically there can be no perception and recognition of the abnormal which is not based absolutely upon a preconceived knowledge of the normal. It is doubtless the general consciousness of this which is prompting the admirable studies which are now being made of the detailed relations of various elements in the normal arches of man. In pre-Darwin days, it was usual to speak of the normal as being grouped into different "types," but the infinite variations found in these types was at first the very basis on which Darwin slowly built up his great theory and afterwards was one of the constant features upon which that theory focused the attention of mankind. And these variations, so infinite in their number, so slight and so subtle in many of their differences necessitated and compelled a different method of regarding what we call the "normal." The old idea of normal "types," or at any rate many of the connotations attaching to this term, has largely passed away and what we call the normal is now regarded by modern biologists and anthropologists as what is called "an array of variates." The variations comprised in any array of variates which together we call the normal, shade gradually by minute differences into what we call the abnormal, and the line of demarcation between the two has never in reality anything about it like the clear-cut outline of a text book diagram. There is a graded transition between the normal and the abnormal through which the one passes almost imperceptibly into the other. If this be so it becomes obvious at once that a study of the variations in

*Inaugural Address, British Society for the Study of Orthodontics, January 14, 1920. Published by permission of "Dental Record," London, England.

and between the normal and abnormal must become a quantitative and not merely a qualitative study. Anthropology has passed through this change and has become largely anthropometry. The subject of our special study—Orthodontics—must pass through the same change and be investigated by similar quantitative modern methods. This change we can see already in progress and the first fruits of the method are now coming to hand. The foundations of the future science and art of Orthodontics are being laid and they are being laid surely and firmly in the intimate study by modern quantitative methods of the normal dental arches of man. This study is likely to be a long and laborious one, and it abounds in pitfalls, for as Sir James Paget said more than thirty years ago, "the higher we climb the hill of knowledge the steeper and more difficult does the ascent become." But if modern statistical methods seem to us intricate and difficult they also provide, for those who will take the trouble to handle them in the right way, necessary safeguards against hasty and imperfect generalisation.

I wish to speak today of Orthodontics as a study in six dimensions. The first three of these are the three dimensions of space as applied to each arch in itself and to the two arches acting together as the incisive and triturating part of the entire masticating mechanism. The fourth dimension is the relation of the normal or abnormal arches severally and jointly to the facial configuration. The fifth dimension is the relation of the various forms of abnormality to etiology and the sixth dimension is treatment.

If we take the first three dimensions together as the three dimensions of space so far as the two dental arches alone are concerned, we shall see at once that in these three dimensions are embraced all the minutiae which have been so elaborately worked out in the relations of the several units of each arch to one another and the relations of the two arches to one another in the whole range of what we call normal and what we call abnormal occlusion. Altogether admirable work has been done by many workers in the past twenty years following the lead of Angle, in minute study of the relations of the many inclined planes of the cusps of the teeth and their importance under the masticating stresses in directing the teeth during eruption to right or to wrong positions in their respective arches, their importance also as interlocking factors in the maintenance of their normal positions and their importance too in the proper functioning of the two arches as triturating organs. But much yet still remains to be done to complete our knowledge of what we call the normal and to ascertain what are the factors which go to determine the different forms of arches which we see, and what are the relations if any between the sizes of the different teeth in an arch and the form which that arch comes to assume, and the relation of the sizes of the several teeth of an arch to the size of the arch as a whole. Here are problems still to be worked out in studies of the many normal variations which we meet in the examination of skulls with normal arches, and their gradual shading by minute differences both into one another on the one hand, and into the abnormal on the other—problems which will require years of consecrated research work and yet the knowledge of which when it has been acquired and when in addition we have learnt to apply it in practice may probably be very great.

At present we have no real knowledge of the various and variable quantita-

tive relations of the dental arches in themselves, nor have we at present any agreed method by which they should be investigated and determined.

Some years ago I worked out an index to show the relative length and breadth of the upper arch in a manner similar to that employed in other anthropometrical indices. For length I took the distance from the mesial extremity of the incisive margin of the central incisor to the centre of the distal margin of the masticating surface of the first molar on the same side. For breadth I took the measurement between the most prominent point on the buccal surfaces of the two first premolars. The breadth multiplied by 100 divided by the length

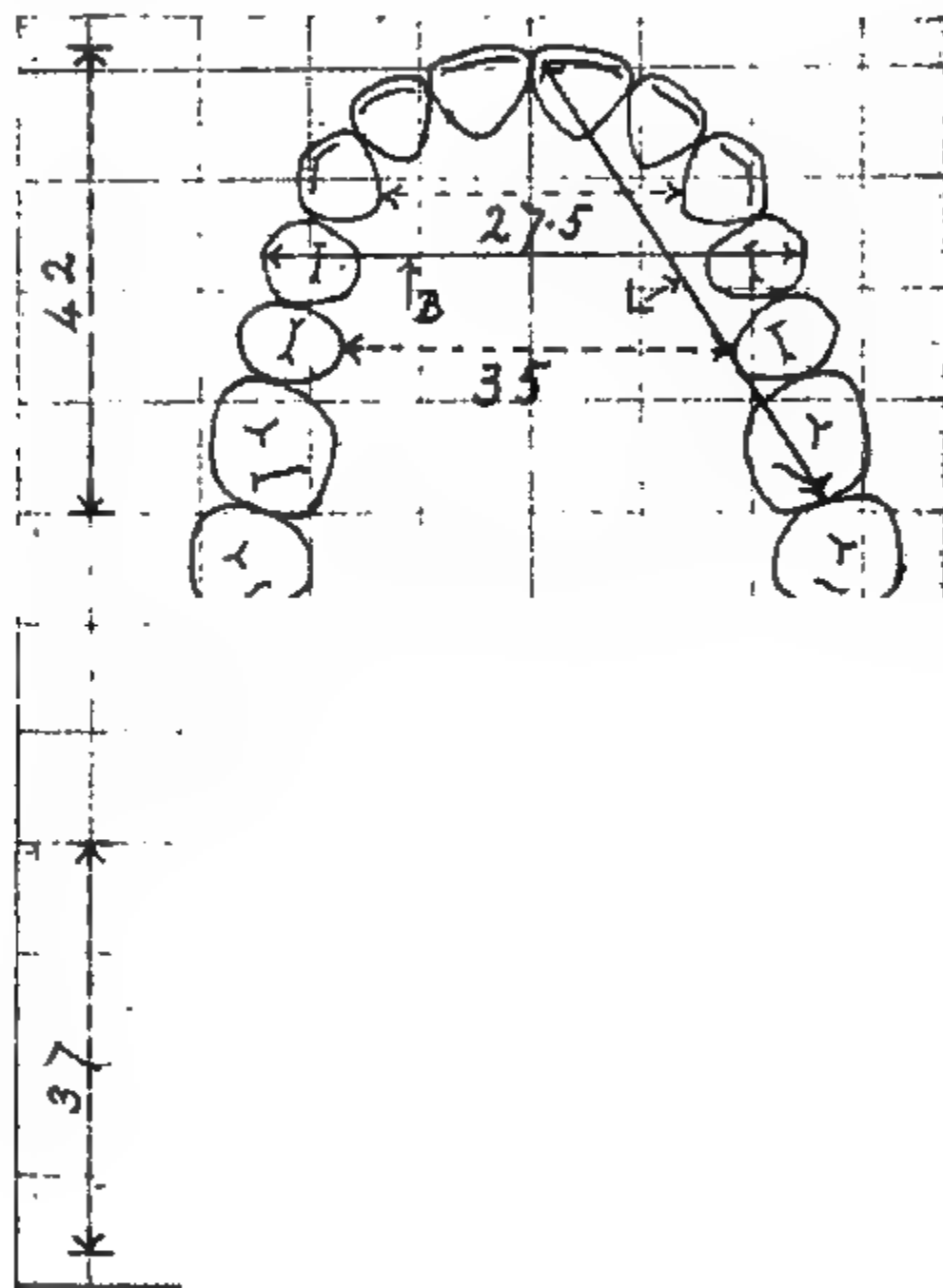


Fig. 1.—Normal arches, age seventeen years.

gave the breadth index of the arch. (Fig. 1.) Pont had previously made careful studies of the relative sizes of the teeth and their relations to the arch as a whole and Hawley constructed a geometrically normal arch to conform to similar data which he acquired. But anthropology does not smile upon attempts to compress its variants into geometrical formulæ like that which has been amusingly designated as "Bonwill's Law," and a geometrically constructed arch perhaps runs the risk of being more geometrical than normal, for it would seem to necessarily lack many of the variations, which we have seen the normal to include. Lately I have come to value highly Bogue's measurements across the

palate between the two second temporary molars and at a later age between the two second premolars. (Fig. 2.) But whatever arch measurements may ultimately be settled upon by a general consensus of opinion we know already most, if not all, of the variations from the normal which fall within these three dimensions; they include the mesio-distal variations from the normal included in Angle's Classes II and III, variations in the breadth of arches, open-bite, and variations from the normal in incisor overbite; variations in Spee's curve, and the various abnormalities of position and inclination of individual teeth and

groups of teeth which have been so variously labeled supraversion, infraversion, torsoversion, proclination, etc., etc. All these studies of the arches and all the abnormalities embraced under these and similar terms come within what I call the first three dimensions of our subject—three dimensions of space as applied to the dental arches considered as two units, and to the relations of the several elements of which these arches are each compounded.

FOURTH DIMENSION—FACIAL CONFIGURATION

I come now to what I call the fourth dimension of our subject—the relation of the normal or abnormal arches both severally and jointly to the facial configuration.

Of close study of the relation of normal and abnormal relations of the

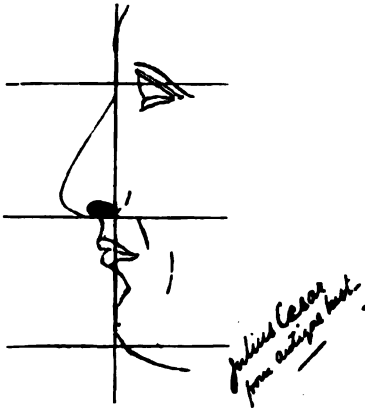


FIG. 3.

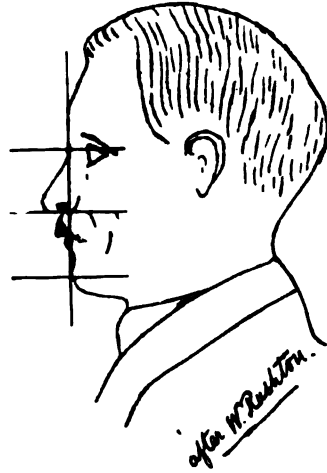


FIG. 4.

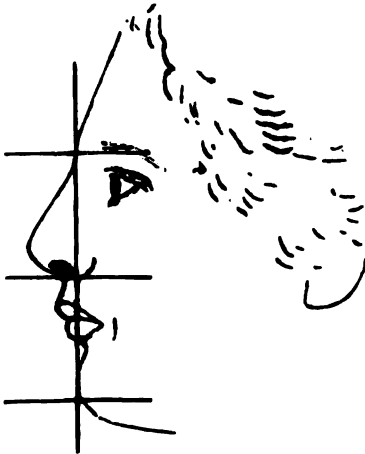


Fig. 5.

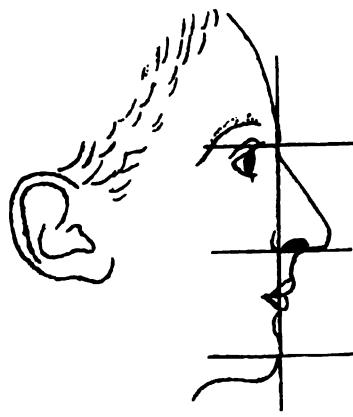


Fig. 6.

arches with facial configuration there has up to the present been very little and I agree wholly with a recent statement of Lischer's that when this work has been done the result will be to break down many of our preconceived ideas of the

whole subject. We talk of "harmony" and "disharmony" in the relations of the dental arches to the facial configuration, but these words used in this connection seem to partake very much of the nature of what anthropologists in their studies and descriptions of primitive man term "holophrases"; and a "holophrase" is merely the verbal form or sound with which civilized no less than primitive man endeavors on the one hand to give expression to his inchoate and quite imperfect knowledge, and on the other hand to camouflage as far as possible his very real ignorance. An amusing example of a "holophrase" was once given me by a medical man who had spent some time in one of the Pacific islands. It was an island to which western civilization had only recently penetrated, an island where the memory of some of the older inhabitants went back easily to the good old days of cannibalism, and when before the advent of western ideas and habits the animals which we call cattle were unknown. When cattle were imported, the islanders were, of course, much impressed by the arrival and dignity of these strange beasts. They heard the individual animals called now by the

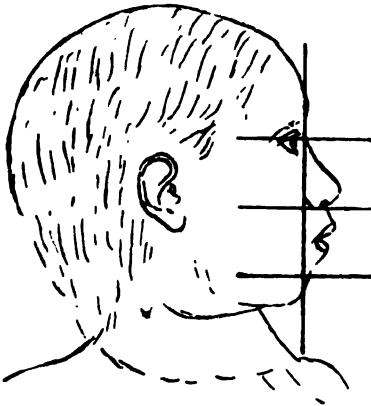


Fig. 7.

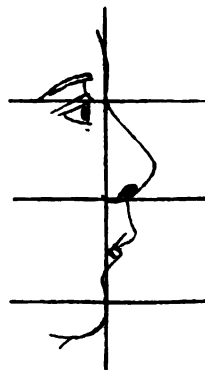


Fig. 8.

name of bull, now by the name of cow, and being at first inappreciative of the difference between them they invented a holophrase to embrace them all and they became known individually and collectively both then and afterwards as "bull-a-ma- cow."

The word harmony when applied to the relation of the dental arches to the facial configuration seems to partake in some degrees of this nature of a holophrase; it seeks to express something of which our knowledge is quite imperfect and to camouflage with as much dignity as possible our real ignorance of the nature and relations of the several elements or factors which go to make up the whole. The task lies ahead of us to analyze it, and find out something more of its nature and proportions. Mankind suffers many of its lapses and retrogressions in the slow upward struggle after what we call "progress" by continually allowing itself to be side-tracked from the paths pointed out by its greatest minds, and we may doubtless learn much from methods akin to those which are employed by artists in their studies of the human face.

I have found much help in studying the correlated abnormalities of the arches and face by a line drawn from the nasion or bridge of the nose to the

most prominent point of the chin. In what seemed to me the best of the normal and subnormal profiles this line nearly touches the posterior border of the nostril. The upper lip projects in front of this line about one-quarter or one-third of the amount of the projection of the nose. The lower lip projects somewhat less. If a horizontal line be drawn at right angles to the vertical one

Fig 9.—Subnormal. Age ten.

Fig. 10.—Adenoids removed one year previously. Shows also condyle path and angle of mandible.

Fig. 11.—Full face of Fig. 10.

at the nasion, a second horizontal one at the lower border of the nose, and a third the same distance below the second as the second is below the first, the chin is always below this third line.

Figs. 3, 4, 5, 6 show sketches of normal and Figs. 7 and 8 abnormal faces. Figs. 9, 10, 11, 12 and 13 photographs of subnormal and abnormal faces.

The difficulty of any study of this kind is that there are really no fixed

points which can be readily used and applied to both young and adult faces. To find such points or a reasonably stable basal line is a desideratum which awaits research and determination.

FIFTH DIMENSION—ETIOLOGY

The causes of dento-facial abnormalities have been assigned to two groups, extrinsic and intrinsic, and of the former we know perhaps a good deal, of the latter we know little. In a brief and rapid survey of our subject as a whole, it is difficult and perhaps unnecessary to summarize our knowledge of today. It may be helpful to try and search for a way by which it may be made more complete in the future and since these abnormalities are essentially the manifestations of abnormal development, it would seem that the careful study of development, both of normal and abnormal cases, may be one of the paths leading to a fuller knowledge of etiology. The development of the dental arches in themselves

Fig. 12.—Angle's Class II, Div. 1. No adenoids or nasal stenosis. Fig. 13.—Angle's Class II, Div. 1. Adenoids.

and in their relations to the face seems to be both sporadic and spasmodic. It goes on at one place, it seems to be arrested at another, it is in active progress at one period, it is quiescent at another. It is contingent, doubtless, for these variations on conditions of general health and environment and its variations must be studied in close relation to them.

Sir Frank Colyer gave us at our last meeting a most valuable contribution in the form of the progressive development of the dental arches of three individual children, through all the stages of childhood. Studies of this same kind in other children will, no doubt, show wide differences both in form and in time, and these variations when correlated with conditions of general health and surroundings may point to conclusions which we at present lack; but this search must also be extended to the relations of the dental arches themselves to the facial configuration, and I wish to bring before you a few results from some measurements taken recently on this point.

Justice seems not yet to have been done to that admirable instrument with the less admirable name invented by Dr. Sim Wallace and improved by Mr. Northcroft. I mean the prosopometer. It enables us to get sagittal measurements of the anteroposterior development of the face from the line of the external auditory meatus without the distorting error of diagonal measurement, and the results seem promising for further investigations.

From a number of measurements of faces of all kinds and ages I have selected a few from three groups, aged respectively nine to eleven, fifteen to sixteen and adult. Those cases selected were all with normal or subnormal arches and facies and in this respect are suitable for comparison.

The measurements taken were as follows:

- A. From the nasion to the lower border of the nose.
- B. From the nasion to the incisive margin of the upper central incisors.
- C. From the nasion to the masticating surface of the upper first molars.

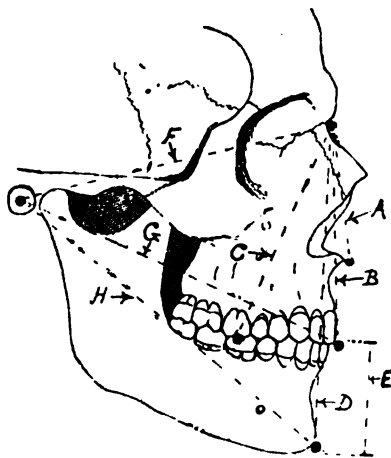


Fig. 14.

D. From the nasion to the lower margin of the mental prominence of the mandible.

E. From the incisive margin of the lower central incisors to the lower margin of the mental prominence of the mandible.

F. From the line joining the two external auditory meatuses to the nasion.

G. From the same line to the incisive margin of the upper central incisors.

H. From the same line to the tip of the mental prominence of the mandible.

The lines of measurement are indicated on the accompanying diagram, Fig. 14.

The last three measurements are sagittal measurements which are easily made with the prosopometer.

The callipers used for the first five measurements of the series were fitted with a curved plate the arc of a circle of about an inch diameter, which enabled it to be securely seated and held on the nasion while the measurements were made.

The measurement to the masticating surface of the molars was taken by means of a steel rod spanning the molars, the thickness of which was afterward deducted.

Table I gives the measurements in millimeters of the three groups of cases with the means, standard deviations and mean increases, etc.

Table II gives for more ready comparison only the means, standard deviations and mean increases.

TABLE I

LINE ON DIAGRAM.	AGE IN YEARS.	NO. OF CASES	MEAN.	S.D.	MAX.	MIN.	MEAN INC.
Nasion to lower border of nose A.	9 to 11	10	42.9	± 2.55	47	38	10.3
	15 to 16	9	49.3	± 2.26	52	45	
	Adult.	10	53.2	± 3.75	60	49	
Nasion to edge of upper incisors. B.	9 to 11	10	64.0	± 2.19	69	61	12.7
	15 to 16	9	72.6	± 4.11	78	65	
	Adult.	10	76.7	± 4.56	86	72	
Nasion to upper molars. C.	9 to 11	10	67.1	± 2.53	72	63	13.7
	15 to 16	9	74.0	± 4.3	80	66	
	Adult.	10	80.6	± 4.04	87	74	
Nasion to chin D.	9 to 11	10	100.1	± 2.60	103	95	22.7
	15 to 16	9	111.4	± 5.49	119	102	
	Adult.	10	122.8	± 7.67	136	114	
Lower Incisors to chin. E.	9 to 11	10	35.8	± 1.17	38	34	8.9
	15 to 16	9	40.8	± 1.83	43	38	
	Adult.	10	44.7	± 3.34	51	42	
Auricular meatus to nasion. F.	9 to 11	10	89.9	± 4.1	99	85	10.5
	15 to 16	9	95.6	± 3.16	99	89	
	Adult.	10	100.4	± 3.87	105	92	
Auricular meatus to U. Incr. Edge. G.	9 to 11	10	86.6	± 2.97	91	82	14.0
	15 to 16	9	94.0	± 4.29	102	89	
	Adult.	10	100.6	± 6.36	113	90	
Auricular meatus to chin. H.	9 to 11	10	98.6	± 3.67	105	92	21.3
	15 to 16	9	104.3	± 4.9	109	96	
	Adult	10	119.9	± 8.65	138	103	

TABLE II
MEANS AND STANDARD DEVIATIONS

LINE ON DIAGRAM	9 TO 11 YEARS.	15 TO 16 YEARS.	ADULT	MEAN INCREASE
A.	42.9 \pm 2.55	49.3 \pm 2.26	53.2 \pm 3.75	10.3
B.	64.0 \pm 2.19	72.6 \pm 4.11	76.7 \pm 4.56	12.7
C.	67.1 \pm 2.53	74.0 \pm 4.3	80.6 \pm 4.04	13.7
D.	100.1 \pm 2.60	111.4 \pm 5.49	122.8 \pm 7.67	22.7
E.	35.8 \pm 1.17	40.8 \pm 1.83	44.7 \pm 3.34	8.9
F.	89.9 \pm 4.1	95.6 \pm 3.16	100.4 \pm 3.87	10.5
G.	86.6 \pm 2.97	94.0 \pm 4.29	100.6 \pm 6.36	14.0
H.	98.6 \pm 3.67	104.3 \pm 4.9	119.9 \pm 8.65	21.3

These groups of measurements, while of course quite insufficient for establishing any criterion of the normal, yet seem suggestive enough to justify a large series being obtained from which the standard deviation might be calculated in normal and subnormal cases, and provide a criterion which might prove of use in approaching the etiology of the subject from the standpoint of development.

The many and multiform variations of and from the normal and also the causes of these variations are all comprised in what I have ventured to call those five dimensions of our study, and it would seem that any scientific classification of dento-facial abnormalities must also embrace these same dimensions. The final and definitive classification will not be possible until each of these dimensions shall have been more intensively studied and until our knowledge of all of them is more

complete than it is at present. But the advance which has been made in the last thirty years gives good augury for the future. Time was within the brief space of memory of many of us who are here to-night, when we were content to classify what we call dental irregularities into groups on which we dabbled such labels as V-shaped arches, saddle-shaped arches, anterior protrusion, protruding canines, etc.; these represent only a primitive stage in the history of the subject, and we have left them far behind. Angle's classification has since come and may in due time be also expected to go: it, too, represents an old tendency in medical history, the tendency to appear exact by disregarding the complexity of the factors and variations involved. One of America's representative men, Ralph Waldo Emerson, told us that "if a man fasten his attention on a single aspect of the truth and apply himself to that alone for a long time, the truth becomes distorted and not itself, but falsehood." What we call the scientific side of man's mind is not a whit less prone than what we call its religious side to build up idols of its meagre finger-breadths of knowledge and to call those idols the truth. Angle's classification has long seemed to me such an idol, its very simplicity and definiteness are perhaps no very inexact measure of its inadequacy, for by concentrating our attention primarily and most insistently on the relations of the two arches to one another in one dimension of space and ignoring the other four cognate dimensions to which I have referred it presents in its way a striking illustration of Emerson's dictum, and despite the very real practical convenience with which it enables us to indicate with a numerical label certain broad categories of abnormalities in *occlusion*, after studying these in their wider maxillo-facial relations, one comes gradually in time to regard it with the uncomfortable sort of feeling that a structure which is balanced on one leg when it really needs five is not a structure which has about it much assurance of permanence.

Of later classifications there are those of Norman Bennett and G. Villain, of these the latter is entirely etiologic. The former, Bennett's, is wider in scope and is suggestive of the truth in two ways; first in reflecting adequately the complexity of the whole subject itself, and secondly by bringing us up repeatedly against those unknown factors which go to determine the normal or abnormal development of the associated osseous structures. Recent researches on the results of dietetic modifications of foods like those of which Mrs. Mellanby gave us in November so brilliant a demonstration may well prove of great significance, and such dietetic factors acting through or interacting with the functioning of the ductless glands may give the clue to a knowledge of the etiology of our subjects for which up to the present we have sought in vain.

I have now outlined five of the six dimensions into which I conceive the subject matter of our study to extend: of the sixth dimension or treatment, it is unnecessary to say anything here and now. It presses itself insistently on our attention and recalls us again and again to its further study by the incessant mingling of success and failure. It is well able to maintain for itself its rightful place in the whole story of the subject; a story which is being slowly unfolded by this and other kindred societies and workers, and a story the end of which is not yet in sight.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

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PLASTIC SURGERY OF THE FACE*

BY JOSEPH C. BECK, M.D., AND JACOB JESSER, D.D.S., CHICAGO, ILLINOIS

THE subject I am to present to you was selected by your secretary, and I thought that in order to make it as interesting as possible I would present some cases, photographs and casts rather than lantern slides, dealing with plastic surgery. I have nothing to present to you in the way of war surgery, and I make this statement at the outset so that the gentlemen who are to discuss my remarks may know that these are not war cases.

We have learned much in regard to war surgery from the English surgeons, particularly Gillies, which we can now apply in civil practice. One of the two things I have learned from him is the use of osteoperiosteal grafts for the reconstruction of bony structures of the upper and lower jaw and nose; and the other is the use of long migrating tube flaps. I might simply illustrate this by saying that a big flap may be taken from the side of the chest and formed into a tube, sewed up upon itself with the epidermis externally and allowing it to become firm and self-sustaining. This is quite an advance in plastic surgery. These osteoperiosteal grafts, usually from the tibia, can be made as long as you wish to have them.

In civil practice we have two types of plastic surgery: (1) cosmetic type, such as hump nose, saddle nose, or a lateral deflection or twist; and (2) reconstruction type due to pathologic changes or injury. These are conditions which are mostly dealt with by men in our line of work (rhinologists) and require very little explanation.

These casts will give you an idea of the usual cosmetic deformities which require correction.

Such a deformity as shown in Fig. 1-A is best corrected by refracturing and plating. A large hump of the nose (Fig. 1-B) would be dealt with by re-

*Read before the American Society of Orthodontists, Chicago, Ill., April 5-6-7, 1920.

moval of the hump through the interior of the nose. A saddle nose such as shown in Fig. 1-C can be dealt with by the introduction of a tibial graft through the interior of the nose. One of the most difficult things to correct is a lateral defect of the nose, Fig. 1-D, where the cartilage is missing. In such

A

B

C

D

E

Fig. 1

a case transplantation of cartilage is used, although the result at best is not very good. A deformity such as that shown in Fig. 1-E, where you have marked destruction, is analogous probably to a war deformity and requires a great deal more work than the previously shown cases.

The cases I am going to show are extreme deformities of the face, particularly the nose (pathologic deformities), in which reconstruction has been attempted.

Case I. (Fig. 2.) A young lady who has been the subject of maltreatment. This plate shows what her condition was originally (Fig. 2-A). We see many cases of imaginary deformities in people who seek some means of having the deformity corrected and they should be discouraged from such action.

This girl applied to physicians to correct the deformity, which would seem to be a broad tip of the nose, and since no surgeon would do it for her, she consulted a so-called beauty specialist or charlatan who injected a mass

A B C D

E F G H

Fig. 2

of paraffin. The injection of paraffin was followed by a growth of tissue around the paraffin, causing a tumor or paraffinoma. This tumor was not only deforming, but it discolored the skin and became very painful, so that it was necessary for me to remove that material in order to relieve her pain. These pictures show in series (Fig. 2) what was done. I excised the paraffinoma which reached into the orbit, the cheek and down over the lip. Subsequently I used twenty-five to fifty milligrams of radium over the connective tissue to stop this growth. The next step will be a plastic operation, where we shall take the skin either from the arm or some neighboring part of the face.

I present this case as warning against the use of injecting paraffin into tissues. One never knows when he is going to strike a subject that will respond to the growth of a paraffinoma which may take on almost malignancy, causing terrific pain. Paraffinoma not only causes pressure on the nerves but

may produce a neuroma and a neuroparaffinoma has been claimed to be malignant. Of course it is not so malignant as a sarcoma or carcinoma.

Case II came to me with the condition as shown in Fig. 3, *A* and *B*, the result of lues.

I proceeded in her case by reconstructing the nose from what was left of



A

B

C

D

E

Fig. 3.

A

B

C

D

Fig. 4.

it, rebuilding the tissues from the neighboring parts (Fig. 3-*B*) and bringing it out so that I formed a sort of tip to the nose (Fig. 3-*B*). I made a hole above the tip of the nose (Fig. 3-*C*), and brought the tip farther down. A triangular flap was brought from the forehead sliding it down and uniting it to the tip of the

nose (*C*). Now comes the further reconstruction of building up of this tip and making the flaps larger to bring the tip of the nose out. She had a perforation of the palate (Fig. 4-*A*) and wore a plate (*B*) which was so made as to push the tip of the nose out. When all reconstructed work is completed a permanent plate will be made with an appliance to supply the support lost

A

B

Fig. 5.

through the lack of the nasal bones. She is now wearing an artificial nose made by Dr. Jesser, until further reconstructive work is performed. (Fig. 4-*C* and *D*.)

The next case I have to show is an interesting one on account of the pathology. This man came with a true tuberculosis of the anterior part of the



A

B



C

Fig. 6

nose, which had to be entirely sacrificed both by surgery and radium treatment. (Fig. 5.) The tuberculosis was entirely cured. It is two years since the operation was performed, and now comes the reconstruction. It is a fairly good looking cosmetic nose, although not artistic. Nothing is more gratifying than the appreciation of these patients for what you do for them in a cosmetic way. It is their own nose, and no matter how beautiful the prosthesis they do not want it. They want their own nose. These pictures show as we have proceeded in this case the steps of the various operations. (Fig. 5.) This work consists of rebuilding constantly, taking a little tissue from here and there. We are ready now to do a Wolfe graft, the nose having been lined inside and skin graft outside with fair nutrition. He is now ready to have the bridge and nostrils made.

The next case is interesting from the standpoint of the etiology. When a child this boy had some form of eczema or erythema and the family physician by mistake applied a corrosive substance which destroyed the greater part of the nose as well as the eyelids and lips. As you see by the first picture (Fig. 6) there is no nose and there is very much scarring of the lip and face. These pictures represent the number of operations that he has been subjected to to reconstruct what we have so far. He has a bridge to his nose, a little finger having been used to reconstruct the bony structure. He has an upper lip which we made with a flap from his arm and portion of his eyebrow, which we transplanted from the back of his head, taking pieces of skin (Wolfe grafts) with hair and transplanting them. Some of these did not live, but others have remained. Recently we have made him nostrils. He has a septum, and we are using the inlays of rubber tissue until we have good sized nostrils, so that he can breathe through his nose, next we shall make a columella.

Another interesting feature is the anesthetic. This man has had thirty-three operations, all done under general anesthesia. We must marvel at that, because his blood, urine, kidneys and heart were without any bad effects from the anesthetic, and this contributes something in the way of science from that standpoint. The anesthetics were scopolamine and morphine with a slight amount of chloroform. The patient could not take a local anesthesia.

Fig. 7 shows a cleft palate case. The patient has been operated upon a number of times, cicatrization having taken place making it impossible to do any shifting of tissue, as is usually done. He had a complete cleft which reached far over to the anterior surface near the teeth. I was able by the aid of Federspiel clamps to bring the parts together so that I united the uvula and rest of the soft palate. There was still a large anterior bony perforation which I failed to close and this I recently succeeded in doing. He did not want to wear a plate so that I devised another method by sacrificing the inferior turbinate. I removed half of the posterior end of the inferior turbinate and left it attached anteriorly, freshened the margin of the perforation and sutured the turbinate to the margin with wires. To my great satisfaction the turbinate healed in and closed the palate. In small perforations of the hard palate where the ordinary methods fail, this method should prove very useful.

Here is a young man I show on account of the method used to reach a

large tumor in the postnasal space, a fibrosarcoma which I was able to reach through the palate by slitting the palate on one side of the uvula up to the hard palate, retracting, and delivering the tumor and then leaving the palate open for subsequent x-ray treatments.

While speaking about cleft palates I wish to say that no matter how well the palate is united, they never have the clear distinct voice which it is possible to produce with a prosthesis. They do not seem to have occlusion of the postnasal space, even with all the intensive training they receive, and their articulation is not as good as it might be.

Fig 7.

DISCUSSION

Major Joseph D. Eby, Washington, D. C.—When I was ordered to the colors in September, 1917, I reported to the School of Plastic Surgery in St. Louis, the first one of its kind, where one of our instructors was Dr. Beck. I had the pleasure as well as honor of obtaining a wonderful amount of information from him in that school. His work was demonstrated on several injected cadavers, freshly prepared, which showed all forms of rhinoplastic and other forms of facial plastic repairs. That was the laying of an excellent foundation for the work which materialized and came into my hands during the last two years of my career.

After the signing of the armistice I was ordered to the Walter Reed Hospital, Washington, D. C., which was designated as one of three institutions for the correction of maxillo-facial injuries. One of the institutions was shortly afterward closed. So with my associate, it has been my honor and privilege as a young man and as an orthodontist to serve between 450 to 500 of our wounded boys who needed hospital attention.

Dr. Beck paid a well deserved compliment to Major Gillies, of England, and in our work we have received an abstract of the literature and have been brought in contact with

many men who have treated maxillo-facial injuries. My present associate (Dr. Williams) spent several months with Major Gillies. Through Colonel Logan, I was brought into close personal contact with Major Gillies, the only essayist at the National Dental Association meeting last year, who spoke on maxillo-facial injuries and their treatment.

I feel in the light of my knowledge of the work done by our Allies, as well as by such men as Colonel Blair, Major Schaefer, and last, but not least, Lieutenant-Colonel Robert H. Ivy, of Philadelphia, our United States boys received as good treatment as the soldiers of any other nation from these great and skillful men, and the high character of their surgical and plastic work shows that they need not take off their hats to anybody. (Applause.)

The operation which Dr. Beck spoke of as having been presented by Major Gillies in which pieces of osteoperiosteum containing a portion of the cortical process of the outer plate of the frontal bone are everted by means of a pedicle beneath a soft tissue pattern for nose replacement from the forehead, has been given the name by Major Gillies of the Indian operation, claiming that the Indians had long ago practiced rhinoplasty for certain injuries or deformities.

I did not receive any communication as to what the nature of Dr. Beck's paper would be and what ground he would very likely cover, hence some of my remarks may not be exactly relevant in discussing Dr. Beck's paper, but will show those conditions met with in war surgery.

We have acquired 1500 photographic records of these patients, as well as innumerable wax colored casts and models of all forms. While the British and French literature is in advance of ours, I feel quite sure that within the next year, with the continued preparation of the work done in this country, you will find that a great number of very interesting things will be forthcoming and much better than I am capable of showing here.

An important question for consideration is the one of plastic repair of eyebrows from bullets particularly, as well as loss of substance. Colonel Ivy has been instrumental in making some partial repairs by cutting a small pedicle from the border of the hair line with the broadening of the pedicle, carrying the superficial temporal supply down by suturing the anterior three-fourths of the grafts to the desired position, thus establishing collateral circulation, and the pedicle being returned as much as possible to its original position. One or two slight secondary operations will improve the condition very materially, so that brow plastic is a most effectual means for the location of material.

In some instances of very high explosive fragments, the orbital socket is obliterated, or the orbit has to be enucleated, and some additional pedicle grafting is necessary to stimulate the eyelids or to provide a sulcus to hold the prosthesis space. We must figure on a slit border of a flap that has been thrown up to relieve the ectropium of the lid, and after slitting the border, comb the eyebrow, apply a graft, using some stiffening paste or wax, and a proper strip of material which will carry a heavy skin graft to replace the lost eyelashes.

We have had some remarkable plastic work done in the eye service in cases of phosphorus burns and smokeless powder burns. In some instances the eyes have been burnt terrifically.

I recall one case in which both upper eyelids were completely destroyed, with remarkable restoration following a plastic operation, and save for the absence of the orbicularis palpebrarum muscle and its function in the closure of the eyes, one would hardly realize that plastic repair had been made of the upper lid. This repair was done by everting a pedicle from the cheek so that collateral circulation was picked up, the flap excised and returned.

In another patient a high explosive fragment entered through the parotid gland region in front of the ear, traversed beneath the malar process and the zygomatic fossa and destroyed the nasal process to the right and left superior maxillary bone, and destroyed sufficient of the glabella to cause loss of support. The right superior maxilla is lost. The overlying skin was intact. The tip of the styloid process was saved. The scar was excised and redundant tissue everted into a flap.

There is a very intimate borderline between orthodontia in our study of facial cosmetics and in our ability to aid the plastic surgeon, and we should be perfectly familiar with the

possibilities of his work in order that he may aid us. If that such is true, we have an instance in this particular case.

We have several cases where the half of the missile was through the face, undermining the floor of the orbit, establishing double vision, not destroying the eye, in which we had to elevate the eye. We took cortical bone from the tibia, cutting a horizontal slot in the malar eminence and a corresponding nick in the nasal border of the superior maxilla, and the cortical bone inlaid in position to endeavor to sustain the weight of the eye. The cartilage in that instance would absorb by pressure. Stimulation of this tissue was sufficient. It was first essential to undermine a portion of the face; the entire middle curve of the face was cut into the least, and what the orthodontist could do was to provide anchorage for the nostril and hold it, and later provide a stage for modeling composition to hold a large flap of skin to epithelize the great raw surface.

Of all the wonderful things our beloved Dr. Case has done, his technic for taking impressions and making an artificial velum or soft palate restoration, is one of the best. In the same manner we secure remarkably accurate impressions, making a soft rubber bulb insert, and later an edentulous ridge containing teeth upon which a second insert can be snapped. This patient looks quite himself again.

Where the tip of the styloid is involved in an injury, particularly where the missile has passed through the face and caused at the point of exit great loss, such a case can be handled by the free grafting of fat taken from the abdomen or undermining the skin, or taking the fat from adjacent areas from the pedicle. There is no tendency toward growth of the subcutaneous fascia in the face or abdomen. It is a question always of not having to perform pedicle grafting by bringing skin from remote areas, with possibly excising scar tissue and undermining the adjacent skin and drawing it together.

In presenting these cases, I hope to impress you with the close relation existing between plastic surgery and orthodontia. There are certain cases in which the best results can only be obtained when orthodontic methods are employed to stabilize the parts during repair. If I have given you anything of interest I feel greatly repaid for coming here.

Dr. Joseph C. Beck (closing the discussion).—The cases presented by Major Eby are a revelation to me, because before I went to Europe I had no idea from my reading of the literature that there was such remarkable progress being made in orthodontia and in prosthetic work.

In my visit to the Walter Reed Hospital Colonel Ivy was kind enough to show me everything he had. I met Dr. Schaefer in Baltimore; I visited Fort McHenry, and saw much of Dr. Blair's work in Jefferson. I spent a number of days in these different places to acquaint myself with what had been done in this war. I am sure, one thing that has been accomplished is a more thorough knowledge of mechanics in connection with the support of tissue for plastic surgery. Even now following the war, in the enemy country which I visited after the armistice, particularly Prague, they were not making use of the advances that had been made in plastic surgery. Among the advances that have been made are the osteogenesis that follows implantation and the tubal flaps of Gillies.

I want to correct Major Eby in one statement he made about the so-called Indian operation where he said the Indians were the ones that used these flaps. You will find in the literature that where a flap is taken from the forehead it is known as the Hindu operation.

I agree with what Major Eby said about American records of cases and the importance of their publication, and if the material that has been accumulated can be published in book form, it will prove invaluable to plastic surgeons and orthodontists.

Perhaps I ought to apologize for bringing this subject before you in such an unfinished manner, because had I known the discussion was going to be such as it was, I would have brought with me reports of cases that occurred in my own experience during the war, but I thought the subject I have presented and the cases I have shown would be of more interest to you.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

SOME OBSERVATIONS OF THE RADIODONTIST

BY L. R. MAIN, D.D.S., ST. LOUIS, MO.

THERE has been so much written on the subject of dental x-ray (using this term in general) that it is with considerable hesitancy I attempt to present anything under the title of Radiography. And yet there are some things that come under observation, which I am sure will be of value to all interested in oral diseases.

We are realizing more and more the value of good teeth and that they are so vitally connected with our anatomy that their diseased condition will in many instances affect the whole physical economy.

There is perhaps nothing that has done more to stimulate better dentistry than the advent of the x-ray in dental practice; at the same time, while it has increased our possibilities, it has tremendously increased our responsibilities to our patients, when used as a diagnostic aid in locating dental focal infection which might be an etiologic factor in systemic disturbances. We are face to face with a public demand and also a demand from the medical, as well as from our own profession, to safeguard and conserve the health of our patients to the limit of our ability. For years there has been a universal call from the dentist, for a closer relationship with the medical profession. The greatest step in this direction has been brought about by the intelligent use of the radiogram.

It has been said there is no labor-saving device yet invented, to relieve the pressure in practice of the everyday dentist. This in a measure is true, but I have seen scores of cases where if the x-ray had been resorted to in the beginning of dental operations, it would have saved the operator and patient months of time, also considerable expense and suffering.

Now there is no man among us who is more in sympathy with the problems of the dentist than I, for I well know the difficulties which we daily meet and

know they occupy a large share of our time and no small effort on our part. But in order to progress, we must be unbiased in our judgment and face facts as we find them today. With the coming of the radiogram, we have seen a new form of dentistry develop, until now the things which occupy the mind of the progressive man were wholly undreamed of a decade ago. Yet there are many men who still find it unnecessary to use the x-ray and continue their practice, guessing at what lies at the apex of a devital tooth, instead of advancing with, and using the means obtainable for ascertaining all information possible before treatment is instituted. In Fig. 1 you will note a central incisor which is hopelessly abscessed and this tooth was treated three months before an x-ray was made.

I want to come close to my subject and state some of the things I have observed after using the x-ray as an aid in diagnosis for nearly five years; first, patients, generally speaking, are very easily convinced of the value of a complete radiodontic examination to enable the dentist to intelligently diag-

Fig. 1.—Upper right central.

nose and treat their teeth, and usually they do not see the necessity of a partial examination only, for example, sometimes patients are referred for an x-ray of the upper teeth, when the neuralgia is along the course of the first and second branches of the fifth nerve and the teeth are suspected as a possible cause. I have had the same experience when the eyes were affected. It was just as necessary to eliminate a focus of infection around a lower tooth, as an upper tooth, even though the symptoms of infection are in the orbital region.

Patients do not realize, however, much difference between a complete and thorough radiodontic examination and an examination which simply shows the teeth with practically no real information. This should be brought to their attention by the dentist. Figs. 2 and 3 are equally good radiograms, but Fig. 2 is a detriment to the patient as well as the dentist, as it gives no information because the angle is wrong. Fig. 3, the same case taken from the correct angle, shows definite areas of radiolucency on both the central and lateral. One will again note Figs. 4 and 5, one radiogram is as clear as the other, but the area of rarefaction in Fig. 4 falls at the apex of the lateral, a vital and normal tooth, because the angle is wrong. In Fig. 5 the area is on the central, a devitalized tooth, and is taken from the correct angle. In many cases it is

impossible to make a diagnosis without considerable knowledge of dental anatomy and pathology and also by the constant use of the vitality test.

Many times radiodontic examinations have been made where patients were referred by physicians, because of systemic disturbances. All other examinations being negative, the teeth were suspected as a factor. In many of these cases I have found several areas of rarefaction, which were no doubt the result of infection. The patients tell us that their dentist had just completed going over their teeth and in some cases they have just finished paying a good-sized bill, and now it seems advisable to have most, if not all, of these teeth extracted. This should impress upon us the necessity of first making a full diagnosis of all cases before we commence dental construction, to avoid such

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

unpleasant happenings. These cases frequently give rise to the question, "Is the physician overstepping his bounds when he advises extraction of teeth, after an honest effort is made at diagnosis?" The question again comes up, "Are we extracting too many teeth?" I fully realize in many instances this is true. And all too often teeth are sacrificed on the advice of many physicians and dentists without as complete information as could be had, simply because some one else was relieved of similar symptoms by such procedure. But again, we as dentists frequently find fault with the medical man on his advice to extract certain teeth because it seems advisable under the existing

conditions. All too often when the medical man suspects the teeth as a factor in some systemic disturbance and refers his patient to a dentist, we give them a clinical examination and as there is no pain about the teeth we return a negative report. Many and many times physicians ask what they are to do in such cases. Frequently every other examination is negative, the patient is suffering from metastatic infection, clinical examination of the mouth reveals several apparent devital teeth. Has not the physician a right to a radiodontic examination? Is not the patient entitled to all information possible in his own case? Could there be any objection to securing all information possible so that an intelligent diagnosis and possibly a prognosis could be made? There sometimes is.

Recently I had two experiences which might be of interest. One woman was referred two different times to her dentist by her physician, stating her symptoms and asking his full cooperation in finding the cause for her neuralgia, of which she had been suffering for fifteen years. Both times a clinical examination was made and a negative report returned. Finally she was referred for an x-ray examination. The trouble was located, corrected, and her neuralgia disappeared. The other case, a man of fifty-six, was brought to the office in a taxi because of his weak physical condition. He also said, because of the uncertain complications, his physician referred him to his dentist, who made a clinical examination only and also returned a negative report. When a full and complete examination was made, with the aid of radiograms, the cause of his trouble was located and when removed, perfect recovery followed. So again the question is asked, "Is the physician going too far in his recommendations?" Or is it a question of, "Are we going far enough in dental diagnosis?" These two cases are simply typical and can be duplicated many times in any office, where an honest effort is made in diagnosing.

To my mind one of the greatest detriments to an x-ray examination of the teeth and jaws is the prevalence of this examination by those who are not thoroughly trained in this particular field of work. The mistakes made are simply appalling and some of the radiodontic interpretations would be a joke if it were not so serious. Just the other day I saw two cases which are so extreme as to sound unbelievable, but nevertheless true. Both cases were taken on large 8"x10" plates. First, a man about forty years of age had a fistulous discharge, no doubt the result of an abscessed lower first molar, a condition which the dentist sees every day of his life. A radiogram was made at such an angle as to throw the shadow of the pharynx across the mandible in the region of the premolars and first and second molars and without another exposure a diagnosis of necrosis of the mandible was made, apparently because of the darkened area in this region caused by the pharynx. The jaw was operated on, three vital teeth extracted, and the bone "scraped" searching for the necrotic bone, which was not found. Another radiogram was then made by a dentist, who found the bone entirely normal with the exception of the mutilated area caused by the operation. In the second case, a woman about forty-five years of age had her lower teeth extracted while visiting in another state. On her return home, several small pieces of process came through the gums, as is frequently the case, and she became uneasy. After

consulting a doctor here, he deemed it advisable to radiograph the mandible, which was good practice. The plate was very, very much overexposed and of course the bone appeared dark, almost too dark to trace the outline of the mandible, and a diagnosis of cancer was made and the patient was advised to go to the hospital for an operation at once. This she did not do, but instead consulted a pyorrhea specialist who, after examining the radiogram, advised her to consult a radiodontist and have her jaw x-rayed with the proper exposure, and the result showed normal bone throughout.

We find conditions in oral radiography which are sometimes responsible for systemic disturbances beside periapical infection. Many times when all the teeth are vital, it is considered unwise and unnecessary to make radiodontic examinations. One of these conditions is pyorrhea. In all cases of pyorrhea the radiogram is advisable, and in severe cases it is imperative before an intelligent prognosis can be made. The old theory that the infection from around these teeth is taken care of, when swallowed, by the gastric juice is perhaps true, but some infection is also carried into the circulation and many symptoms of secondary infections clear up entirely when vital, but pyorrhea teeth are treated or extracted.

A *B*
Fig. 6.—*A*. Lower left. *B* Lower left.

Another condition, which is perhaps given little consideration, is the possibilities of nerve reflexes as a result of hypercementosis, impacted teeth, or too long retention of deciduous teeth. Many cases of headaches are the result of hypercementosis, as this is usually due to chronic irritation, causing unusual activity of the cementoblasts.

A few years ago, a young woman came to the office for an examination and an impacted upper third molar was located. This tooth was removed and she returned after a few days and said she had stopped vomiting. On questioning, it was found she had had spells of vomiting for five years and nothing thus far had relieved her until the impacted third molar had been removed. While I am conscious the so-called diseases of dentition are greatly overrated, still there are cases where the first dentition causes a great many gastric disturbances. So is it too far-fetched to suppose that pressure exerted by impacted or unerupted teeth on the nerve endings of the trifacial could not give rise to a reflex through the pneumogastric nerve and affect digestion?

In Fig. 6 will be noted the first permanent and first and second temporary molars in position, with the premolars well locked under the temporary molars.

Also in this case, there is no resorption of the root ends of the temporary teeth. History: Boy ten years of age, very anemic, spells of vomiting, diarrhea, lasting over a period of three months, the cause of which could not be ascertained. Teeth suspected, but clinical examination was negative, as there was no apparent decay and all teeth were vital. Finally an x-ray examination was made and the eight premolars were located as shown, not erupted because of the temporary molars being in position. Is it not possible that because of too long retention of these temporary teeth, the pressure on the inferior dental nerve, at the root ends of the premolars was severe enough to produce a reflex to the pneumogastric? It was deemed advisable to extract all temporary molars and the exodontist afterwards stated these teeth were as difficult to remove as the average permanent tooth. Six weeks later the mother reported the child had not vomited since the loss of the teeth.

I do not intend being critical, except as it may provoke progress in our thinking. To my mind, the greatest service we can render the human family is to conserve health, and this is in no small measure possible in the practice of dentistry. The fact that dental disturbances do influence the general health is accepted and we must ride with the tide and not pull against it. For in preventing and eliminating foci of infection about the teeth, wherever possible, we at least strengthen the patient's resistance by so much. In so doing, preventive dentistry and in many instances preventive medicine will go hand in hand.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Mechanics in Orthodontia, from a Modern Aspect. Milo Hellman. The Dental Cosmos, 1920, lxii, No. 12, p. 1385.

The ideas advanced in this contribution are summed up by the author as follows: Orthodontia as a whole can under *no* circumstances be regarded as a problem in mechanics alone. The processes involved in the natural movement of the teeth are intimately associated with inherent tendencies of the teeth and their supporting environment. The tissues involved in orthodontic procedure do respond to mechanical forces, but not in accordance with physical laws. The teeth are moved artificially by processes of a *biochemical* nature. The construction of orthodontic appliances constitutes the only mechanical process in orthodontia and requires no extraordinary skill or special engineering or mathematical training. The manipulation of orthodontic devices in the treatment of malocclusion of the teeth is an art, and it is of considerable advantage to be endowed with special artistic talents besides mechanical skill in order to excel. Orthodontic treatment can be carried out by the dentist, but only in a subordinate manner, i.e., under the special supervision of an expert, upright, honest and sincere orthodontist; one who has the interests of the patient at heart and is convinced to the best of his judgment that in exceptional cases it can be furthered by a combined effort. To control the efficiency of an appliance is what taxes the utmost ability of an orthodontist; for an appliance will do what we desire it to do and at the same time it will do some other things besides. Again, an appliance may be prevented from doing some things that we do not wish it to do, but fail to do what we desire it to accomplish. It is only by the cultivation of absolute mastery over the possibilities of an appliance that it becomes an instrument to express our will in just proportion as necessities demand. Viewed from this aspect, the treatment of malocclusion of the teeth becomes an art that ranks foremost in the art of healing.

Orthodontia—The Ribbon-Arch Mechanism and Some New Auxiliary Instruments. E. H. Angle. The Dental Cosmos, 1920, lxii, Nos. 10-11, p. 1157.

The author in this contribution elaborates further upon the ribbon-arch-bracket mechanism introduced by him in 1916 and which has been accorded a widely favorable reception. The principle of this mechanism may be advan-

tageously extended to apply in retention. Some other orthodontic inventions and ideas are offered by him which are for the most part designed to assist directly or indirectly in the employment of this mechanism and to facilitate as well as improve the work of orthodontists. The ribbon arch is light and delicate, this fact explaining its even and continuous action; when it is used, the stimulation of the cells is nearly physiologic. It therefore provides sufficient power to meet all demands, especially for widening and narrowing dental arches, unless the mistake is made of accidentally bending it in such a way as to reduce its power when the arch is finally placed in position upon the teeth. The twist or torque of those portions of the arch that lie within the curvilinear sheaths is a force quite as powerful as the usual simple expansive or contractile force of the arch and should be utilized by giving the ends of the arch the proper twists before inserting them in the sheaths, so that they will bind for a tilting outward or inward movement of the crowns of the anchor teeth when this is needed. The power to be gained from the twist in the arch applies equally to the relation of the arch with the brackets as to its relation with the sheaths. Orthodontic efficiency and success depend largely on understanding these problems in dynamics. When the two forces conflict, through a faulty adjustment of the arch, they will to a certain extent neutralize each other. Aside from lateral movement of the teeth outward, the power of the arch is abundant for all other movements of teeth, both of roots and crowns, the tooth movements being prompt and satisfactory. This is due to the great range of elasticity in the arch, coupled with the very ideal attachment of the teeth to the arch, which firmly controls their movement, but which at the same time permits them desirable freedom. In view of the fact that without proper supervision the teeth may move too far, a still more delicate arch may prove more advantageous in certain cases. The bracket attachment can also be used as a retaining mechanism. In the first application of the arch, and for gaining the necessary lateral twist in the arch to effect rotation, or forming the decided bend for engaging a bracket on a tooth that is in pronounced lingual occlusion, the special pair of ribbon-arch seating pliers devised by the author will be found of great assistance. Lock pins made of a fine quality of brass are the most desirable in the opinion of the author; they are best clinched in the brackets by drawing them sharply at right angles to the latter and clipping the bent pin off close to the side of the bracket, leaving no projection. Minute pincutters have been devised by the author for cutting the pin close to the side of the bracket without disturbing the bend. Attention is called to the occasional necessity for the employment of strong little cleats, which must be properly located and soldered to prove efficient.

By means of the delicate new curvilinear sheaths of the anchor bands, the arch can be prevented from working forward and the friction nuts can be kept firmly seated within their attachments. Moreover, the arch, without auxiliary attachments, may be caused to work distally within such sheaths when this is desired, even to exerting considerable force for the retraction of prominent incisors. Another advantage in the use of the curved sheath is that the ends of the arch can be left to project well through the distal ends of the sheaths,

at least in the beginning, instead of cutting them off close, thus not only giving a longer arch which may be useful later on as the dental arch is enlarged, but offering longer continued resistance to the natural tendency of the arch to forward displacement as its ends gradually travel forward in the sheaths through tightening the nuts than would be the case with a shorter arch. Finally, the curved sheath interferes far less than the straight sheath with the functions of the cheeks.

Plain bands on anterior teeth are most accurately placed, and with the best cosmetic effect, by first indicating with a lead pencil mark on the moist surface of the enamel of all the teeth to be banded the position that the incisal margin of each band should occupy. The bands are then easily pinched and shaped so as to conform to these lines, with the result that after the teeth have been gradually moved into conformity with the line of occlusion, the bands as well as the teeth will assume harmony and balance of relation. A new, very perfect and efficient instrument has been devised by the author for holding and pinching the band material about a tooth. The band material is cut between the beaks of the new band-forming pliers and a most accurately fitting band is finally obtained by means of this method of band making. As regards the fitting of bands to molars, the author believes it is not possible to gain the proper adaptation of a plain band to a normal molar tooth, this being only possible with a clamp band, and then only when the band is most carefully and skilfully fitted. Within the past year the author has worked out a method for adjusting and fitting the clamp band which insures the most perfect adaptation of the band to the enamel, not only at the swell of the crown, but equally at the gingival margin, thus closely conforming to the physiologic requirements of all the tissues, as well as affording the greatest firmness of attachment. The new protective medium for attaching the bands, instead of cement, is paraffin, which possesses possible advantages over cement for molar bands, but the superiority of which remains to be proved by the test of time. It has been used in the author's practice for about eight months, with satisfaction.

The wire ligature must be correctly applied in order to gain the full amount of force desired and to maintain it continuously; the twist being used only as a means of locking the strands and holding the tension which is gained otherwise. A ligature or any other attachment can be efficient for the control of force only in proportion to its firmness and its faithfulness in maintaining tension. The author's new instrument is recommended for the accurate and efficient application of the wire ligature as well as for the even and painless control of the force in the placing of the ligatures.

A movable work table, suited to the needs of the modern orthodontist, planned by the author, is now in use among a number of his former students, and is making good as an adjuvant to modern orthodontic work and as an addition to the general appearance of the operating room. For the production of accurate models of the teeth of patients, the hard brass blade of the model plane used in this work is advantageously faced with steel. The difficulty of impression taking is lessened by a modification of the impression tray for which the illustrations in the original article should be consulted. The ribbon arch and its attachments may be reduced in size and strength in order to serve

efficiently for the retention of teeth after they have been moved into the desired positions. A more delicate arch-bracket mechanism is useful for the correction of malpositions of deciduous teeth or recently erupted permanent teeth in mixed dentures. The most natural place for the application and operation of active orthodontic mechanism is labially and buccally to the teeth, as there is here far greater opportunity for the freedom of force and for force control as compared with the much more restricted lingual region of the dental arch. Instances may occasionally arise, however, where lingual mechanism would be more advisable, so that the author does not mean to restrict active mechanism to the labial and buccal surfaces of the teeth.

Lack of Facio-Cranial Development from Endocrine Insufficiency. P. Robin.

Comptes rendus hebdomadaires des séances de la Société de biologie, 1920, lxxxiii.

Functional insufficiencies of the endocrine glands may seriously affect the shape and size of the bones of the face and skull, thus inducing esthetic changes and functional disturbances, proportionate to the gravity of the causative lesions. The author for more than twenty years has been treating the irregularities of the jaws and the dental arches, which are usually the first signs of lack of facio-cranial development, by means of functional methods, and more especially by organo-therapeutic measures; with very favorable results in the form of improved appearance of the face and relief of functional disturbances of the buccal and nasopharyngeal cavities. It is a noteworthy fact that the bones of the face and the skull are nearly always attacked as a result of pluriglandular insufficiency, the most prominent superficial changes being those shown in the irregularities of the dental arches, as well as protrusion or retraction of the chin. The lack of development in the face or skull corresponds to a lack of development of the important underlying sinuses, which causes compression of the vascular and nervous structures passing through or beneath them, with resulting impairment of the mechanisms of respiration, digestion, sight, hearing, smell, speech, and last, but not least, mastication.

Osteitis of the Lower Jaw in the Course of Eruption of Wisdom Teeth. Guilly.

La Revue de Stomatologie, 1920, xxii, No. 8, p. 456.

The author reports three cases concerning two men of thirty-five and twenty-nine years, respectively, and a young woman of twenty years, who were attacked by osteitis of the lower jaw in the course of eruption of wisdom teeth. In these observations, the pathogenic agents derived from the buccal cavity directly reached the pericorony sac, the cellular tissue, and the maxillary bone. In the first case, where the cervical glands were inflamed and swollen, the infection travelled by the lymphatic route to the cervical glands. The first disturbances concerned the mucosa and were followed by symptoms of bone-involvement. Lockjaw, with pain, is one of the earliest clinical manifestations. It is originally a defensive contraction of the masticator muscles which rapidly disappears if the infection subsides. But an infection of more prolonged standing becomes propagated through the cellular tissue to the masticator muscles

and gives rise to myositis which is sometimes very obstinate, due to cicatricial contraction of the muscles. In the author's cases, although these were of several months' standing, the lockjaw did not reach this degree of severity and rapidly subsided after the elimination of the sequestrum and the disappearance of the suppuration. Neuralgia was present in all these cases, located at the angle of the jaw, with multiple radiations, chiefly towards the neck and ear. The persistence of pain after extraction is an important sign, being not infrequently referable to bony complications. The infection as it becomes propagated from the pericorony cavity to the cellular and bony tissue, manifests itself by swelling of the tissues which often suppurates very rapidly. The gathering pus tends to rush the subcutaneous cellular tissue and to open externally, which should be guarded against as well as possible. In the great majority of cases, immediate extraction of the responsible wisdom tooth is indicated, when serious symptoms are present, and its removal is almost invariably followed by rapid and complete recovery. Alveolar curettage is an indispensable supplementary procedure in infected cases.

Epithelioma of the Buccal Mucosa. L. Imbert. *Marseille Médical*, 1919, lvi, p. 123.

Cancer of the buccal mucosa is perhaps slightly less frequent than cancer of the tongue and represents a very uncommon disease of great malignancy, with well-marked and early glandular involvement. The primary nodule remains undetected for a long time and is generally situated behind the commissure, promptly spreading in the different directions open to it: (1) Over the entire extent of the mucosa, especially downwards; (2) on the gums, whence it reaches one of the jaws, preferably the lower; (3) on the skin, the tumor ulcerating through the cheek and appearing on the outside in the form of an ulcerating neoplastic proliferation; (4) to the glands, usually the submaxillary glands. The teeth are almost invariably carious in these cases, but instead of referring these patients to a stomatologist before surgical interference, it seems preferable to perform the necessary dental extractions in the course of the operation. It goes without saying that all carious teeth and fragments should be removed, but the author considers it a good routine procedure to extract all the upper or lower molars. This precautionary measure guards against the frequent and practically constant recurrence in so far as these are hastened by contact with the teeth in a mouth where cleanliness is very difficult to maintain after the operation. Resections of the superior or inferior maxilla were never required in the author's personal experience, and the recurrences invariably occurred in the soft parts or in the glands. The operation, when the skin is not ulcerated, begins with a large and deep incision which continues to the cleft of the mouth as far as the region of the ear-lobule, following the interdental space. Two flaps are thus obtained, an upper and a lower one, which on being turned back permit a very free exposure of the tumor. When the skin is involved, or merely threatened, the single incision is replaced by a double incision which encircles the neoplasm above and below, widely opening the mouth. This first step provides very good access and nearly always permits a complete extirpation. The formation of the two flaps is followed by

resection of all the neoplastic or merely suspicious tissues; keeping in mind the fact that many recurrences are observed in the soft parts. In case the underlying bone appears suspicious, it should be extensively scraped, above and below. If enough tissue is left behind, the gap is simply closed, after establishing the labial commissure; otherwise, a more or less rectangular flap is prepared for the closure of the gap. The extirpation of the submaxillary glands, when these are involved, is an indispensable part of the operation. The immediate results are favorable, and the patients make a good recovery, but remain exposed to the two-fold danger of constriction of the jaws, and recurrence, which is common. The tumors may reappear in the preserved soft parts, in the glands, or very often in both these localities together. Constriction is also practically constant in these cases, for even when a very large flap has been applied, the absence of a mucous covering on its deep surface gives rise to adhesions which are very difficult of control. The author utilizes for this purpose the dilators in use for the treatment of constriction after-war-injuries, especially wooden wedges which the patients introduce themselves between the jaws, in the morning and at night, with the result that a certain degree of buccal opening is maintained.

Conduction Anesthesia of the Inferior Dental Nerve. J. Bercher. *Paris Médical*, 1920, x, No. 36, p. 193.

The author emphasizes that conduction anesthesia at the level of Spix's spine is technically simple and devoid of danger, while its results are absolutely reliable and complete. In dental practice, painful interventions on the lower jaw are a matter of everyday occurrence, such as difficult extractions of molar teeth, pulpectomies, scraping of osteitic foci, removal of tumors of all kinds, reduction of recent fractures for fixation of the fragments, and still more frequently, the often difficult and lengthy avulsion of wisdom teeth. For their correct performance, all these operations require a perfect anesthesia. The inferior dental nerve supplies the lower jaw as well as its teeth and the mucosa which covers it. Derived from the inferior maxillary nerve, this nerve trunk penetrates into the body of the bone at the level of Spix's spine, which covers the posterior orifice of the dental canal. Precisely at this point it should be sought and reached, in order to obtain total anesthesia of the horizontal ramus and the angle of the lower jaw. The author's choice of an anesthetic solution is a 2 per cent Novocaine solution with addition of a drop of adrenalin 1.1000 per c.c. About 4 c.c. of anesthetic solution are required to produce a thorough loss of sensibility, but this dose is a moderate one, which may be exceeded, up to 10 c.c., if desirable. A sterilized glass syringe, holding 5 c.c., armed with a fine platinum needle 7 cm. long, constitutes the only equipment needed for the application of anesthesia of the inferior dental nerve. After the fluid has been injected, from five to fifteen minutes must be allowed to elapse before the infiltration of the nerve-trunk is complete. The onset of anesthesia is tested by exploring the sensibility of the gingival mucosa. A properly applied anesthesia usually suspends at the same time the sensibility of the lingual and auriculotemporal nerves. The duration of the anesthesia varies according to the injected dose, from thirty minutes to three hours.

The Innervation of the Soft Palate. M. Inouye. *The China Medical Journal*, 1920, xxxiv, No. 4, p. 58. (Department of Anatomy, Tokyo Imperial University, Japan.)

The author's investigations concerned the motor nerves of the soft palate, as well as the relation between the soft palate and paralysis of the facial nerve. His observations were obtained by the anatomic and comparative anatomic methods, embryologic research, and physiologic experiments upon five monkeys in the form of electrical irritation of the trigeminal nerve and the pharyngeal plexus. On comparing the results, almost all were found to agree perfectly, so that the observations can be summarized as follows: The muscle of the uvula is supplied by the posterior palatine nerve which is a branch of the second division of the trigeminal nerve. The levator muscle of the palatine velum is innervated by the pharyngeal plexus, and probably also by a branch of the posterior palatine nerve, sometimes also by the middle palatine nerve. The motor fibers which are contained in the palatine nerves are probably derived from the root of the trigeminal nerve. The author's anatomic investigations would seem to show that the motor fibers of the palatine nerves came from the second division of the trigeminal nerve, pass through the sphenopalatine ganglion and supply the soft palate. His physiologic experiments showed, in one of the five monkeys experimented on, that the soft palate moved at the electric irritation of the trigeminal nerve. Furthermore, recent clinical observation also indicated that the soft palate is not affected by a paralysis of the facial nerve. Some motor fibers of the trigeminal nerve presumably pass not only through the third division, but also through the second division to the soft palate, and they do not come from the facial nerve. The muscle of the uvula is innervated by way of the palatine nerves, ciliary ganglion and second division of the trigeminal nerve.

Primary Tuberculosis of the Buccal Mucosa. B. Bernstein. *Zahntechnische Rundschau*, 1920, xxix, No. 37, p. 432.

Primary tuberculosis may affect any portion of the buccal mucosa, although the frequency of localization varies greatly in individual cases. The tongue and the hard palate are most frequently attacked, whereas the mucosa of the cheeks is only rarely involved. Affections of the gums rank about halfway in order of frequency. All ages and both sexes are subject to the disease, but the patients are usually past thirty years of age, and men are more likely to be attacked than women. According to the author's investigation of the literature, together with a personal observation, among 251 cases of tuberculosis of the buccal mucosa, 75 cases were to be regarded as primary, making about 30 per cent. The evolution of the tuberculous lesion often begins at first with thickening and softening of the mucosa, the diseased locality contrasting sharply from the healthy surroundings. As a rule, however, small roughened nodules which promptly break down again are seen at an early stage, constituting tuberculous ulcers with irregular, superficial, or deeper ulcerations. Whereas, in luetic ulcers the margins are sharply outlined, punched out, as it were, tuberculous ulcers present irregular, undermined, overlapping borders, of an

eroded appearance, surrounded by a close circle of small, red granulations, which are absolutely characteristic. The floor of these ulcers looks lardaceous and often presents miliary and submiliary nodules. Similar nodules often originate also in the near surroundings and likewise undergo disintegration, finally giving rise to a large, grayish, ulcerated surface, which can very early be misinterpreted as a luetic lesion. As to the etiology, particularly in primary tuberculosis of the buccal mucosa, an infection with tuberculous milk enters into consideration, the transmission of animal tuberculosis to man having been proved possible. A case of primary tuberculosis of the buccal mucosa due to infection with milk containing bacilli of bovine tuberculosis was described by Weber in 1907. The possibility of autoinoculation is illustrated by another case in which a hospital nurse infected herself by a needle which had dropped into tuberculous sputum.

The resulting disturbances are relatively slight, especially in primary tuberculosis of the buccal mucosa. The patients complain of excessive salivation, a burning sensation, and a bad taste in the mouth. Pain is not as a rule very severe. An offensive odor is almost invariably present, especially in extensive disintegrating processes. In contradistinction to tuberculosis of the buccal mucosa of secondary origin, the prognosis is almost uniformly favorable in primary cases. Timely recognition and proper treatment will usually guard against recurrence. Local treatment alone enters into consideration as a therapeutic measure in primary tuberculosis of the buccal mucosa. Operative removal of the tuberculous focus, by excision or cauterization, is perhaps the most promising, but as the operation has to extend into healthy tissue, a more or less considerable formation of scar-tissue is often left behind, which may lead to disfigurement and functional impairment. Radio-active substances have also been advantageously used in the treatment of tuberculosis of the buccal mucosa. In the author's case, concerning an otherwise healthy young woman of 21 years, with a tuberculous ulcer on the inside of the lower lip, the size of a bean, a cure was obtained by means of combined, almost daily, treatment with 50 per cent lactic acid and sunlight radiation.

A Case of Compound Comminuted Fracture of the Inferior Maxilla. J. N.

Parr. Transactions of the Indiana State Medical Society, 1868, xviii, 75.

"On June 25, 1866, I was called in haste to see a young man on whom an old log church had fallen, while he and others were trying to remove it. He was taken out of the rubbish almost dead, but had revived by the time I got there. I found, upon examination, that the submaxillary bone was fractured in three places, viz., on the left side, the neck, on the right, the body, about half an inch from the symphysis; and the third, about midway between this and the angle. The soft parts embracing the integument and buccinator muscle were torn in two most of the way from the commissure of the lips to the ear. Finding it impossible to adjust the parts, hold them, and bandage them alone, I called medical assistance. There was nothing new in the treatment. The only, or chief trouble was to get the loose fragment between the second and third fracture to stay in its place. For this purpose we adjusted it, and then tied the teeth nearest the points of fracture together with a silk thread. The

soft parts were stitched, and all the fragments of the lower jaw brought in proper coaptation with the upper. Then a single broad bandage, so tight that it was impossible for the teeth to slip upon each other, was passed under the jaw and over the top of the head. The patient lived on fluids about one month, and made an excellent recovery, leaving no deformity whatever. The point of interest is, the simple means by which the parts were held together; no clumsy apparatus."

The Treatment of Congenital Lateral Labial Clefts. (So-called Hare-lip). R. Drachter. Centralblatt für Chirurgie, 1920, xlvii, p. 194.

The author's procedure is based upon many years' experience on numerous cases of congenital lateral labial cleft, the operation having been found of great value as a routine measure for all cases of unilateral congenital hare-lip, simple, as well as complicated. In the presence of lip-cleft alone, or lip-cleft with alveolar cleft, but without palatine cleft, it is best to wait a few months, if there is no demonstrable interference with the patient's health due to the hare-lip, in the form of respiratory or gastrointestinal disturbances. The operation can be performed under more favorable circumstances, in so far as the infantile organism has become more resistant, and the thickness of the lip has essentially increased. Hare-lip of the first and second degree requires early operation only in exceptional cases, and these children are best not operated upon until the end of the first six months of life. In the presence of lip-cleft with alveolar and palatine cleft, the operation should be performed as soon as it offers prospects of complete success, for the closure of the labial cleft in these cases means the removal of a condition injurious to the general health. Moreover, dating from the instant of junction of the upper lip, the closure of the alveolar gap and narrowing of the gap in the hard palate follow automatically. The operation promises to be entirely successful when the child is about six to eight weeks old, when its weight increases in proportion to the age and size, and when other diseases, such as fever, etc., are absent. The work is done under local anesthesia; not only the portions of the lip adjacent to the gap-margins should be rendered anesthetic, but also the region where the labial mucosa passes to the upper jaw. The skin of the field of operation must be thoroughly disinfected by washing with alcohol. The rules of asepsis must be strictly observed during the entire intervention. It is not advisable to operate upon the hanging head, on account of the increased hemorrhage, the patient should either be held in the vertical position, or be placed upon the operating table in an approximately horizontal position. The technic of the operation is as follows: (a) The lip is detached from the upper jaw. This detachment is necessary in the majority of the cases, especially when the nostril is displaced. A gauze tampon is placed at once upon the resulting raw surface; this diminishes the hemorrhage and prevents the drainage of blood into the buccal cavity. (b) Formation of two small flaps, consisting only of lip-red, by means of strong, straight scissors. During the formation of these flaps, the lip is stretched and moderately compressed with the index finger and thumb of the left hand. The small flaps are left entirely in site and are sufficiently substantial to guarantee their nutrition and survival. (c) Freshening of the

gap-margins under compression of the lip between the index finger and thumb of the left hand. The flaps must not be touched with instruments, for fear of damaging them. The wound margins should be as wide as possible. (d) The wound-margins are closed with fine interrupted silk sutures, all threads remaining untied for the time being. (e) All the sutures having been applied, the threads are tied, preferably from below upwards. In addition, one or two very fine threads, one passing only through the mucosa, may be utilized for the widest possible mutual adaptation of the flaps. (f) No dressings at all are used, the site of the suture remaining entirely uncovered.

In the treatment of bilateral hare-lip, the author recommends operating first on one side, and about six to eight weeks later on the other side, in the manner described above. His method of flap-formation differs essentially from all other procedures described in the ordinary textbooks.

Advance of Odontology. H. Allaeys. *Revue Belge de Stomatologie*, 1920, xviii, No. 5, p. 253.

A college of odontology, connected with the medical faculty, has just been founded in Montevideo, the capital of Uruguay. The obligatory studies in this school require four years, and the entrance examination is the same as for the medical students. It is encouraging to find this high standard upheld in new countries with a still relatively small scattered population, where the stomatologic ideal cannot for the present be realized. From the date of inauguration of the teaching of this new specialty, the entrance requirements and the program of serious studies are such as to prepare the ways in anticipation of the time when more favorable circumstances will permit the full and entire realization of the aims of odontology and orthodontia. As the author says: "The good work is still going on."

A Peculiar Case of Buccal Hemorrhage. W. Metzger. *Zahntechnische Rundschau*, 1920, xxix, No. 35, p. 401.

The patient was a woman 48 years of age, who came under observation with a history of frequently repeated bleeding from the gums, of about a week's duration. She was wearing two artificial dentures, and after these plates had been removed, local examination showed at first glance an upper jaw devoid of all teeth and roots. The hemorrhage was said to come exclusively from the upper jaw in the region of the lips. All stumps and decayed roots had been removed three years previously, before the application of the denture. On closer examination, the region of the former site of the canine or a small incisor tooth on the upper right side showed two minute punctiform depressions in the mucosa; the one situated towards the palate was found to be the exit orifice of the blood. The two small openings were connected by a bridge of mucous membrane 6-7 mm. in length. As the result of sounding, suspicion arose of a persistent canine root, at a not very considerable depth. The small mucous bridge was cut through, bayonet-shaped forceps were applied, and a hook-like curved root was extracted, without much difficulty. The presence of this root had caused neither an inflammatory process nor given rise to an abscess, but

had evidently led exclusively to this peculiar profuse intermittent hemorrhage. Prompt recovery followed without further treatment, the patient being simply instructed not to wear the upper denture for some days. At the time of extraction of all the other roots, in her upper jaw, three years ago, this right canine root had evidently been overlooked because it was broken off deeply and overgrown with gums. In the course of time, the jaw endeavored to expel this root, but was prevented by the pressure and fixation of the rubber plate, until the mucosa finally gave way at two small points and the curved tip of the root eroded a minute artery which gave rise to the hemorrhage. This unusual case shows how a decidedly bloody operation served to control a not inconsiderable loss of blood.

Ankylosis of the Mandible and Its Operative Treatment. G. Chubb. British Medical Journal, 1920, i, 256.

Five consecutive cases of ankylosis of the mandible came under the author's personal observation and operative treatment. The formation of fibrous or bony adhesions between the anterior border of the coronoid process and the pterygoid surface of the maxilla was found to be a factor in the articular fixation, in all of these cases, independently of the primary cause. The ankylosis was of traumatic origin in four of the five cases, the last being due to infection after a bilateral suppurative arthritis of the temporo-mandibular joints in infancy. The traumatic cases all concerned the molar region and were accompanied by fracture of the zygoma; the temporo-mandibular joint was not involved, and in three of the four cases the fracture of the zygoma directly involved the coronoid process in the resulting adhesions to the surrounding structures. Nevertheless in each case the formation of fibrous or bony adhesions between the lower part of the anterior border of the coronoid and the maxilla could be determined. In each case also, free movement of the mandible was not obtained until the coronoid process had been completely removed down to its base. The author's operation permits of the complete reaction of the whole of the coronoid. In one case this structure was removed on both sides, together with the condylar neck region of either side also. In no case was there any involvement of the facial nerve, and in each case the patient was left with a gape of at least 2½ cm. and a very satisfactory power of mastication. In each case the whole of the coronoid was removed, so that the anterior aspect of the condyle passed in a clean sweep down to the commencement of the alveolar border of the horizontal ramus. The incision for this operation starts in the preauricular fold at the lower level of the external auditory meatus, and passing vertically upwards to the level of the tip of the pinna, curves forward below the superior temporal crest to terminate anteriorly within the hair area of the temporal region. The incision is carried down to the bone, and the skin, temporal fascia and muscle are separately defined and turned forwards. The deeper of the two layers into which the temporal fascia splits as it approaches the zygoma is divided, and the latter bone, still working from the deep aspect of the temporal fascia, is removed piecemeal with gouge forceps. The tip of the coronoid is defined, and both its surfaces cleared of muscular attachments with the raspator. By means of suitably shaped gouge forceps the whole of the coronoid process can now be

removed. During this process the surgeon is working between the temporal muscle and belly of the external pterygoid on the one hand, and the under surface of the masseter as this passes to its insertion into the outer face of the coronoid and angle on the other. Throughout the operation the surgeon stands at the head of the patient, and the approach to the pterygoid region is by way of the temporal fossa.

The Saliva in Diabetics. Rathery and Binet. *La Presse Médicale*, 1920, No. 27, p. 263.

Certain peculiarities have been noted in the saliva of diabetic patients, and these may be summarized as follows: The saliva in these cases is scanty, often viscid, not infrequently acid, and sometimes contains glucose in considerable proportions. The elimination of sugar through the glands has been experimentally demonstrated in animals (dogs) whose blood sugar contents had been raised either by intravenous injections of glucose or by the total removal of the pancreas. Clinically, glycosiahorrhea may accompany glycosuria, or alternate with it, or exist by itself alone, without the appearance of sugar in the urine.

Etiology of Ulcero-Membranous Stomatitis. J. Ferrier. *La Revue de Stomatologie*, 1920, xxii, No. 8, p. 452.

The author points out that in the etiology of this disease, attention must be directed, not so much to the microbic action as to the condition of the mouth itself. As a matter of fact, gingivitis or ulcero-membranous stomatitis have never been observed in a well-kept mouth, no matter how bad the general and nutritional condition; all that is necessary to control the symptoms is to establish perfect conditions of buccal cleanliness. The culture-media must be suppressed from which the microbic invasions constituting stomatitis and acute or chronic ulcero-membranous gingivitis take their origin. Without a culture-medium, there can be no fusospirillary symbiosis. The products of desquamation of the buccal mucosa accumulate more or less as a deposit in the dental interstices and other recesses, where together with the superadded alimentary débris, they form a culture-medium for a variegated microbic flora. Under ordinary conditions of life, the buccal equilibrium is sufficient for the maintenance of health, but in the presence of a general or local weakening of the buccal mucosa, a general weakening of the mucosa lining of the digestive passages, or of the general resistance, a state of general or local congestion, or any other cause of aggravation of microbic virulence, the infection will manifest itself. The starting point may be the covering of the wisdom-tooth or any other erupting tooth, or a dental interstice, or a tonsillar crypt, the infection becoming readily propagated to the vicinity through the uninterrupted chain formed by the interstitial deposits, connected by the intergingivodental grooves; and in certain localities, through contact in occlusion. When the dental interstices are clean and empty, the local foci which may appear under a tonsillar crypt, for example, will remain restricted to their starting-point. The deposits are capable of serving as a culture-medium and are accordingly not the cause, but the condi-

tion of the disease. Removal of these deposits and application of antiseptics to all accessible points, from dental interstices to tonsillar crypts, including all recesses of the mouth, will result in prompt recovery.

Relations between Chlorosis and Dentistry. R. Holz. *Zahntechnische Rundschau*, 1920, xxix, No. 37, p. 429.

The author's discussion of the subject is limited to the relations between chlorotic changes of the blood and dental surgery in the form of extraction of teeth, on the basis of menstrual disturbances in women and tests of the blood pressure fluctuations in chlorotic and menstruating individuals. He examined a large number of women and invariably found a slightly elevated blood pressure on the first day of menstruation; reaching the conclusion that the onset of menstruation undoubtedly imposes special caution as regards menstrual secondary hemorrhage after the extraction of teeth, on account of the rise of blood pressure and increased heart action. Care is indicated especially when the extraction is performed in the late afternoon hours, the occurrence of secondary hemorrhage being favored by the horizontal position of the body at night. No definite statements are as yet available concerning the blood pressure in chlorosis, some observers describing it as too low, others as normal, and still others as too high. The author's investigations of the blood pressure in chlorosis were conducted on about forty women, some of whom were disabled and bedridden as a result of the blood disease. The blood pressure values were determined at the time of the menstrual flow as well as during the interval. Slight elevations of blood pressure were noted in part on the first and in part also on the second day. In a general way it could be shown that at the time of menstruation, chlorotic women who otherwise present a normal, or even subnormal, arterial pressure, frequently have a demonstrably increased pressure, so that caution is indicated in the performance of extractions. In his recent experience, a severe secondary hemorrhage followed the extraction of a tooth in a highly chlorotic patient, requiring four days for its control by means of repeated infusion of physiologic salt solution, internal administration of gelatine, and local measures.

Treatment of Sublingual Cysts. F. Bonnet-Roy. *Paris Médical*, 1920, x, No. 36, p. 184.

The various treatments suggested for the cure of salivary cysts on the floor of the mouth are based on two different principles, namely radical treatment by extirpation of the tumor, or destruction of the cyst-wall by means of chemical agents. Neither is entirely satisfactory, complete extirpation, because it is very difficult or even impossible, and destruction by chemical agents because it is generally insufficient and exposes to recurrences, besides being rather painful. There exists a third method which to some extent partakes of each of the others; it consists in incision and marsupialization of the cyst-sac, followed by destruction of the exposed wall through the action of strong topical applications. This treatment was employed, with encouraging results, in several cases of sublingual cyst which came under observation in the Lariboisiere Hospital, in the course of the last few months. The technic is fairly simple:

An incision of the sublingual mucosa over the transparent protuberance of the cyst, following its long axis, from end to end, serves to expose the wall itself, without damaging it, provided this incision is shallow and very cautiously applied. This first step is not easy, on account of the extreme tension of the sac. The dissection of the cyst-wall is now carried as far as possible, being usually limited externally by the presence of the sublingual gland; it is easier within, where the grooved catheter readily discovers the lingual nerve, and less regularly, Wharton's duct. The upper third of the tumors having been liberated, the cyst is opened with a snip of the scissors, from its anterior to its posterior pole, as far as possible. The sticky fluid contents are allowed to escape, and the entire exposed portion of the wall is then resected, applying small Kocher's forceps over the cut surface. The cyst is now wide open, and presents an approximately hemispherical cavity which is freely accessible. In order to maintain the gap, it suffices to suture the parietal cut surface to the lips of the incised sublingual mucosa, with five or six silk or linen sutures. In the marsupialized sac, a careful cauterization is carried out, reaching the deeper folds, by means of a ten or five per cent solution of silver nitrate. The intervention is made under local anesthesia in tractable patients, or under general anesthesia. The outcome is successful only on condition that during the next following days, the cauterizations are repeated at the rate of three or four weekly, for about a fortnight. The difficulty consists in the extraordinary tendency of the marsupialized orifice to spontaneous rapid closure, so that the persistence of the orifice must be verified every day as long as the cauterizations are continued. In one instance, the author was obliged to leave a small wick in place during twenty-four hours. The cyst-sac promptly loses in depth and becomes reduced to a small blind fistular tract, which is soon obliterated. The patient should be examined at intervals during three or four weeks. At the end of the treatment, nothing is left but a more or less indurated cicatrix which slightly binds the sublingual mucosa and gradually disappears. This procedure must be thoroughly carried out so as to guard against recurrence. A case of partial recurrence recently came under the author's observation, the recurrence being actually limited to the anterior culdesac of a cyst which had been incompletely cauterized one month previously; the primary cavity had become transformed into a fibrous cicatrix. The same treatment was repeated and a cure obtained. Marsupialization and cauterization of the sac, in the author's opinion, constitute the treatment of choice for sublingual cysts.

Epilepsy from Undescended Teeth. Editorial. *The Journal-Lancet*, 1920, xl, No. 19, p. 550.

A careful examination must be made of everything that might possibly act as an epileptic factor, and it goes without saying that the teeth are entitled to a maximum of attention in this respect. The writer is acquainted with the case of a boy, now about ten years of age, who as a young child suffered from apparently typical epilepsy and was regarded as incurable. After he had shed his primary teeth, and his permanent teeth had developed in proper order, the epileptiform attacks subsided and his mental condition greatly improved. Another child, with diseased primary teeth, suffered from convulsive attacks and

was looked upon as an epileptic, but all attacks ceased as soon as the temporary teeth were eliminated from the mouth and the true teeth had appeared in their normal position. These two cases are eloquent illustrations of the necessity of always remembering the dental point of view in pediatric practice. Undeveloped and undescended teeth are probably often responsible for apparently organic nervous disease or functional nervous disturbances. On x-ray examination, molars are not infrequently found lying horizontally in the jaw, unable to descend, but capable of creating considerable disturbance by pressing on the molars in their immediate vicinity. The removal of from one to four molars of this type means a capital operation, which can be performed only by an expert, a skilled surgeon-dentist. Undoubtedly, more attention than heretofore should be paid to undescended teeth, in view of their possible highly pernicious influence upon the delicate nervous system of growing children.

Respiratory Function and Occlusion. L. Subirana. *La Journal Dentaire Belge*, 1920, xii, No. 3, p. 122. (Madrid Odontological College.)

Orthodontic cooperation is indispensable in a very high percentage of surgical procedures for the establishment of physiologic respiration. The author emphasizes the close relation between rhinology and orthodontia, pointing out that normal dental occlusion is formed in only 8 to 9 per cent of all cases and that this perversion interferes with nasal breathing. Malocclusion not only alters the facial outlines and hinders mastication, but it disturbs the relations and modifies the configuration of the bones and muscles of the mouth. The cause of malocclusion dates back to antenatal conditions; when the embryo and fetus fail to develop physiologically, the mutual developmental influence is arrested, which normally exists between the organs of the face and the head, affecting size, shape, and function. Regarding the mouth and the teeth, embryonic conditions indicate the physical influence exerted by the lips, cheeks, and tongue in the establishment of occlusion. The temporary denture, and the permanent denture in later childhood, are factors of great etiologic importance in the development of the jaws and in the production of faulty occlusion. Organic and functional coordination is highly significant in the mouth, on account of the important functions discharged by the mouth and the organs directly related to it. The teeth are held in equilibrium by a system of natural forces; when one of these forces is missing the teeth become displaced, and one of the more immediate results is mouth-breathing. This statement is confirmed by the author's clinical observations, and by his personal experience upon himself, with abnormal dental occlusion. Although any form of nasal obstruction may be the cause of malocclusion of the teeth, the latter may in certain cases constitute the only etiologic factor of mouth-breathing. Surgical rhinologic interference is apt to prove inefficient in numerous cases, unless it is accompanied by dental correction.

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EDITORIALS

A Practical Treatise on Artificial Crown-, Bridge-, and Porcelain-Work*

EVANS' "A Practical Treatise on Artificial Crown-, Bridge-, and Porcelain-Work" was introduced to us in our student days, and we are pleased to welcome the eighth edition. The completeness of the eighth edition surpasses all of our expectations. It almost seems incredible that such a complete treatise on crown and bridge work could be contained in a book the size of the present edition. Dr. Evans has succeeded in getting all the necessary information on the various systems in use today into a book that is well suited to the needs of the student, as well as the general practitioner.

The book is divided into seven parts. Chapter 1 includes a description of the various instruments and materials used in crown and bridge work. This

*A Practical Treatise on Artificial Crown, Bridge and Porcelain Work. By George Evans, D.D.S., F.A.A.D.S., New York. P. Blakiston's Son & Co., Philadelphia. Eighth edition, revised and enlarged. With 567 pages, and 1143 illustrations. Price \$7.50.

is particularly valuable to the student. Chapter II deals with the various metals employed in this work, but refers the student to his work in metallurgy for a detailed description of them. Various impression materials and compounds are considered, including the newer so-called artificial stones. Chapter VII deals with the casting process and gives a description of the various modern casting methods and machines, and calls attention to the advantages of each as found by the author.

In Part II the author discusses the treatment of teeth and roots for the reception of crown and bridge work. This part may be criticized more than any other, owing to the various opinions regarding the proper treatment of pulpless teeth. Poor technic in the treatment of roots of teeth has subjected crown and bridge work to severe criticism. If the tooth is treated according to surgical principles, the method used is not so important. Very often crowns and bridges are placed on roots that are not ready to receive them, and the result is very unpleasant.

Part III is given over to the consideration of artificial crowns. The various types and kinds of crowns are described. This makes the chapter especially valuable to students who should be familiar with the different styles of crown about which State Boards are in the habit of asking. The average dentist will make only a few of these various types of crowns, but should he ever wish to learn anything of the different methods of making restorations this chapter is valuable. One of the important factors in the construction of crowns and in their usefulness is the occlusion, and Dr. Evans calls particular attention to this subject.

Part IV deals with bridge work, its history, and the mechanical principles involved. The various types of bridges are considered, as well as some of the difficulties encountered in their construction and repair. Part V takes up removable bridge work. It is very complete, giving the important features in the construction of the different types as described by modern writers.

The porcelain art is discussed in Part VI. Porcelain bodies are described as well as furnaces and methods of fusing porcelain. Porcelain inlays are considered in this chapter. While they do not come under the classification of crown and bridge work, we see no objection to placing them in this text. The subject is well treated. Part VII is given over to the consideration of crown, bridge, and porcelain work combined with operative dentistry in dental prosthesis. This shows the close relation existing between these various subjects.

To the student we recommend this book as being the best for his needs. It should also be read by the general practitioner who desires to do the best for his patient by employing the method or type of work best suited for the particular case.

Dental Hygienist

THE United States Civil Service Commission announces an open competitive examination for dental hygienist. Vacancies in the Public Health Service throughout the United States at \$720 a year, plus quarters, subsistence, and laundry, or compensation therefor, usually at \$62.50 a month, and vacancies

in positions requiring similar qualifications, at this or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Bonus.—Appointees whose services are satisfactory may be allowed the increase granted by Congress of \$20 a month.

Citizenship and Sex.—All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however, have the legal right to specify the sex desired in requesting certification of eligibles.

Subjects and Weights.—Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

<i>Subjects</i>	<i>Weights</i>
1. Physical ability	25
2. Education and experience.....	75
Total	100

Basis of Ratings.—Under the second subject competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

Registers and Requirements.—Two registers of eligibles will be established from this examination, as follows:

(A) Those who have completed the eighth grade of common school and are graduates from an approved school of dental hygiene or from a recognized dental college.

(B) Those who are not graduates, but have had private training in a dental office for a period equal to that in a school of dental hygiene; or who have been accepted for registration by a State recognizing dental or oral hygienists. Register (B) will be used for appointment when eligibles from Register (A) are not available.

Age.—Applicants must not have reached their seventieth birthday on the date of the examination. At the request of an appointing officer certification will be made of eligibles who are within reasonable age limits.

Retirement.—Classified employees who have reached the retirement age and have served fifteen years are entitled to retirement with an annuity. The retirement age for railway mail clerks is 62 years, for mechanics and post-office clerks and carriers 65 years, and for others 70 years. A deduction of 2½ per cent is made from the monthly salary to provide for this annuity, which will be returned to persons leaving the service before retirement with 4 per cent interest compounded annually.

Photographs.—Applicants must submit with their applications their unmounted photographs, taken within two years, with their names written thereon. Proofs or group photographs will not be accepted. Photographs will not be returned to applicants.

Medical Certificate.—The medical certificate in the application form should be executed by a medical officer of the Public Health Service where practicable.

Applications.—Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington,

D. C.; the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Calif.; Old Customhouse, St. Louis, Mo.; Administration Building, Balboa Heights, Canal Zone; or to the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, *including the medical certificate*, but excluding the county officer's certificate, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on March 1, 1921.

The exact title of the examination, as given at the head of this announcement, should be stated in the application form.

Preference.—Applicants entitled to preference should *attach to their applications* their original discharge, or a photostat or certified copy thereof, or their official record of service, which will be returned after inspection by the Commission.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Missouri State Dental Association

The next meeting of the Missouri State Dental Association will be held in Springfield, Missouri, April 25, 26, and 27, 1921. It will be featured by a short, intensive, postgraduate course.

J. F. Wallace, President,
Carlyle Pollock, Secretary.

The American Society of Orthodontists

The American Society of Orthodontists will hold its twentieth annual meeting at the Hotel Ambassador, in Atlantic City, April 27, 28, 29, and 30, 1921. A cordial invitation to attend this meeting is extended to all interested in orthodontia.

Ralph Waldron, Sec.-Treas.

Williams School of Orthodontia

The next annual summer session of the Williams School of Orthodontia will be held at Glenwood Hotel on Cayuga Lake, Ithica, New York, commencing Monday, August 1, 1921. Prospectus on request. Address: O. T. Rule, D.D.S., Sec'y, 1 Bank Street, Stamford, Conn., or Percy Norman Williams, D.D.S., 40 East 41st Street, New York City.

News Notes of Interest

Major Jos. D. Eby, after completing the maxillo-facial work at Walter Reed General Hospital, filing and indexing all the records, and preparing a museum of the same, requested a discharge as a temporary officer. He is now associated with Dr. Victor Hugo Jackson in the practice of Orthodontia and Oral Surgery, 40 East Forty-first Street, New York, N. Y.

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ORIGINAL ARTICLES

UNUSUAL CASES IN ORTHODONTIA*

BY ADELBERT FERNALD, D.M.D., BOSTON, MASS.

MR. PRESIDENT and members of the Dewey Alumni Society, it is a pleasure to be with you today. When I read President Weeks' letter, and realized what it all meant, I knew it would be my fault, if I did not gain a great deal by attending these meetings.

The title of my paper "Unusual Cases in Orthodontia" may be a misnomer, but in my practice, some of the cases I will show you, certainly are unusual.

In treating extreme cases of open bite, as well as distoclusions and mesioclusions, I often wish I could get some measurement that would be reliable, to show how much the mandible and the teeth have been brought forward or forced back, and which has moved more. First, I will show some instruments I have designed and used for several years, and would find it hard to get along without. I realize that any measurements which are not accurate do not have much scientific value. The difficulty is, in finding a fixed point to measure from. I have tried the bridge of the nose and external meatus of the ears, which gave three fixed points. This instrument had some good features, but children object to having apparatus adjusted in the ears.

The pelvimeter, as you know, is an instrument, used by surgeons to measure the pelvis and other parts of the body, to which I have attached a chin-piece, to measure from chin to back of head. I have also added a coil spring from each arm, so that when measurements are taken, the same pressure will be applied at each measurement. I am aware that some will say these measurements are of no use, that as a child's head develops, the bones growing larger, the child gaining or losing in weight, any measurements one could take would not be accurate, but even so, I have had the pleasure of making the instruments, and no harm has been done, and I intend to keep on experimenting.

The little measuring appliance is attached to upper first or second molar, and

*Read before the Alumni Society of the Dewey School of Orthodontia, April 1-3, 1920.

chin-piece adjusted to the chin, (chin-piece sliding backward or forward on scale) is locked in place and measurement recorded. After treatment another measurement is taken. If the upper molar has not been moved, the measurement will be fairly accurate. By removing the chin-piece and locking movable point to teeth either above or below, the movement of the anterior teeth can be measured before and again after treatment.

Fig. 1.

Fig. 2.

Fig. 3.

The different forms of the lingual arches have always appealed to me and in selected cases the soldered arches, especially in cases where children fool with appliances. For years I have used these little pliers, (Fig. 1) which I have found extremely useful for bending the arch and retainers in the mouth. The handle should have an offset from the point so as not to come in contact with

the anterior teeth, and points made thinner. The jewelers' pliers for adjusting spectacles to the bridge of the nose, I find useful in making arches and retainers (Fig. 2.) These combination pliers, (Fig. 3.) taking the place of five different tools, are very useful in many ways.

In describing treatment of cases I will be brief. In most of these mutilated cases where a premolar or even a lateral is lost, I have preferred to close up the space instead of replacing the missing tooth.

CASE 1.—A boy twelve years of age, class one. (Fig. 4.) Maxillary teeth normal in size, centrals and laterals crowded. Mandibular right second premolar

Fig. 4.—Case 1

Fig. 5.—Case 2.

Fig. 6.—Case 2.

one-third too large, second mandibular premolar enormous, having fourteen cusps, all other teeth normal in size. Radiograms show no other teeth present. The boy says "they are good chewers," so I will retain them. Arches were expanded, and anterior teeth moved into normal occlusion.

CASE 2.—Girl sixteen years old, (Figs. 5-6) mutilated case of distoclusion. Maxillary right and left first molars missing as well as mandibular left first molar. Maxillary second and first premolars moved back, one after the other, closing the space of missing molars, then maxillary canines were carried back making room to expand laterals, so two centrals could be retracted. Intermaxillary elastic was worn until a good occlusion established. This case has been

easy to retain, and a wonderful improvement was made in the personal appearance of the patient.

CASE 3.—Class 2. (Fig. 7.) A girl twelve years old. Unusual in having no mandibular laterals, the radiogram showing none present and no history of any. The upper lip was full. The patient lived nearly one hundred miles away, and I thought that I could simplify the treatment of this case by extracting the maxillary right and left first premolars. The two canines slanted

Fig. 7.—Case 3.

Fig. 8.—Case 4.

Fig. 9.—Case 5.

forward to a great extent, and they were pulled back with intermaxillary elastics until they touched the second premolars. This has given me room to tip the centrals and laterals back nearer to normal. The patient is wearing intermaxillary elastics to bring mandibular teeth forward. The appearance of the mouth has been greatly improved, although the case is not finished.

CASE 4.—Class 1. (Fig. 8.) Girl 14 years old, with mandibular right second premolar missing, space nearly closed. Radiogram showed premolar embedded in lower part of jaw, crown tipped toward apex of first molar root. Have just started treatment on this case.

CASE 5.—(Fig. 9.) Distoclusion. Three of the family had the same V-shaped arch. This patient is a young man, eighteen years old. Maxillary right

second premolar missing, typical V-shaped arch, mandibular centrals and laterals crowded. Arch was expanded in canine and premolar region and maxillary centrals slowly rotated in place by a spring. Maxillary right first premolar moved back to close up space of missing second premolar.

The sister of preceding patient has also distoclusion. Twenty-eight years old. (Fig. 10.) Both maxillary right and left first molars were extracted, as they were badly broken down and abscessed. Arch expanded, canines and premolars on each side were forced back to partly close space of missing first molars, the wisdom teeth coming forward to close the remaining space, without any force

Fig. 10.—Case 5A.

Fig. 11.—Case 6.

being applied to them. Centrals very slowly rotated by a spring appliance. The mandibular premolars on each side are missing. Centrals and laterals crowded. The mandibular premolar will be replaced. At the time of writing, these two cases are not completed.

CASE 6.—Class 1. (Fig. 11.) A young lady twenty-five years old split the mandibular left first molar so it had to be removed. The radiogram showing the third molar present. After waiting seven years, the radiogram shows the third molar in the same position. Suggested moving second molar forward to see if the third molar would erupt. First and second premolars were banded together for reinforced anchorage, expecting it would also be necessary to use

canine, with a tube soldered to buccal surface, second molar banded with long tube soldered parallel to tube on premolar. A bar was placed through each tube with nut on one end, patient wearing elastic bands over ends of each tube. As fast as the second molar moved forward the nut was screwed up and the surplus wire cut off. By the time the space was half closed, I was delighted to find the third molar erupting close to second molar. By the time the space was all closed the third molar was fully erupted, with no space between it and the second molar. From the time the appliance was adjusted until it was removed was nearly one year and a half, the patient being seen every month or two and at this time is thirty-two years old.

The premolars drifted back slightly relieving the crowded condition in the

A

B.

C.

D.

Fig. 12.—Case 8.

central and lateral region. The second molar has been moved forward and only slightly tipped. No retainer was adjusted, the third molar acting as such.

CASE 7.—Neutroclusion. A girl fourteen years old. Maxillary right deciduous molar roots retained, radiogram showing first premolar missing. Mandibular left second deciduous molar retained, but broken down, radiogram showing second premolar missing, roots were extracted. This case was treated same as last, posterior teeth were carried forward to close up space.

CASE 8.—Neutroclusion. (Fig. 12.) A young lady twenty-four years old. Maxillary right canine and deciduous first molar retained, radiogram showing first premolar and canine present, deciduous teeth were extracted exposing the first premolar, which has erupted. After eight months the canine showed no

signs of erupting, so gum and process was removed, crown of tooth exposed, hook attached to lingual side of crown. Tooth in seven months has been pulled into normal position.

CASE 9.—Neutroclusion. Girl fifteen years old, large tongue, spaces between anterior teeth above and below. Four deciduous canines retained in between premolars and laterals, with the four permanent canines erupted or erupting along side of deciduous canines. The maxillary canines erupted in the spaces between the laterals and deciduous canines. The patient having eight canine teeth present, the mandibular left deciduous molar still in place, as well as the maxillary left and right. Radiogram taken and all the deciduous teeth were removed. The two maxillary second premolars are coming into place, but only about half as large as they should be. At time of writing the spaces are practically all closed. I have in position a working retainer, consisting of soldered labial arches with loops on buccal sides. In treating this case I endeavored to



Fig. 13 —Case 10.

bring the premolars and molars forward to close up the spaces so the second and third molars will erupt forward and retain the teeth.

CASE 10.—Mutilated case (Fig. 13) of neutroclusion. A young lady twenty-eight years old, with mouth full of deciduous teeth, mouth in bad shape, gums sore and inflamed. Patient was unable to masticate food properly. Radiogram shows that all four canines had not erupted as well as most of the premolars. At time of writing, all deciduous teeth had been extracted, except the two deciduous maxillary right and left canines, which will be. Inside of four weeks the mandibular right canine had erupted an eighth of an inch. Several of the premolars are coming. I will wait a while on this case to see what Nature will do, assisting where assistance seems necessary.

CASE 12.—A boy eighteen years old. (Figs. 14, 15, 16.) When the mouth is closed as far as possible, only the right second molars occlude, no other teeth in contact. I will call it a mutilated case of mesioclusion, infraversion. One brother and two sisters have the same type of occlusion, but to a lesser degree. By moving the mandibular right second molar forward I have been able to close the bite. The second molar on the left side did not meet by one eighth

of an inch. The maxillary right second premolar had been extracted by a Dentist, who thought to improve the case. Mandibular right second premolar and first molar, mandibular left first premolar and first molar are missing. By closing the bite, carrying the maxillary anterior teeth forward, and retracting the mandibular I will be able to get the anterior teeth somewhere near normal, in fact they now have an end-to-end bite. The missing teeth will be supplied so that instead of having one tooth to chew on he will have many. This case

Fig. 14.—Case 12.

Fig. 15.—Case 12.

Fig. 16.—Case 12.

has been under treatment about one year. I would prefer to show finished cases, but as I am showing unusual ones, I am taking them in all stages.

CASE 13.—Class 1. (Figs. 17, 18.) A boy twelve years old. Mandibular arch crowded in central and lateral region, very large strong teeth. Maxillary left central had erupted outside arch three-eighths of an inch beyond the other central and lateral, the natural space being nearly closed. The maxillary left deciduous canine had been retained, the right lateral and first premolar in contact, upper right canine ready to erupt labially, in infraversion. The

radiogram showed the maxillary left canine to be impacted in the center of the arch at the apex of the two centrals, (Figs. 19, 20) with two supernumerary canines up side down, one above, and one below canine. The deciduous canine was removed, and one of the two supernumerary canines, arches were expanded until space had been obtained, to bring central back in normal position, expansion was carried on still further in the right canine region until canine had



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 22.



Fig. 21.

erupted into near normal position. (Fig. 21.) The impacted canine was exposed by removing gum and process until it could be seen at apex of centrals. (Fig. 22.) A small hole was drilled in the tip and a thread cut, an iridioplatinum-screw turned into place, (Fig. 23) in about five months the canine was pulled down even with the mucous membrane. (Fig. 24.) At writing the canine

Fig. 23.

Fig. 24.

Fig. 25.



Fig. 26.

has been pulled down until three quarters of the crown is in sight, (Fig. 25) it being necessary now to expand the arch a little more before the tooth can be rotated into place. The other supernumerary canine being on upper side of this one, I did not think it wise to remove it at the time the other was, thinking that as the permanent canine came down the other would follow in the line of least resistance, and Fig. 26 shows that it has. Fig. 26 also shows that the

supernumerary will have to be removed, as it will be in the way of canines. Maxillary right second molar has not erupted but radiogram shows it coming. I hope by another year to have the pleasure of showing you this case completed. As this case had so many unusual features, it has been very interesting.

Fig. 27.

Fig. 28.

Fig. 29.

Fig. 30.

Fig. 31.

I have now on hand about twenty cases of impacted teeth, consisting of all canines and premolars.

CASE 14.—Class 2. (Figs. 27, 28, 29, 30.) Infraversion, a young lady seventeen years old, right and left second molars occluding. This is an unusual case in having the two maxillary centrals missing. Patient has suffered from

adenoids and enlarged tonsils, they were removed. Maxillary arch expanded and intermaxillary elastics were worn for nearly two years, and then discontinued. After the intermaxillary elastics had been discontinued for five months, the occlusion was found to have remained the same. The two laterals having a wide space between them were made into centrals by jacket porcelain crowns, which were made large enough to fill the space and act as retainer to hold canines out. As the color and shape blend so well with the other teeth, it has made a great improvement.

When one studies the occlusion of this case (Fig. 31) it does not require much imagination to see that the facial lines and contour would be even, regular and perhaps beautiful. It is a good specimen for us to take as a model to try and place every tooth in like position.

DISCUSSION

Dr. Martin Dewey, New York City.—It is difficult to discuss a paper when you cannot find fault with it. I want to compliment Dr. Fernald on the attitude he has taken toward these unusual cases. I notice a tendency on the part of many men who practice orthodontia to select their cases. We find some men are getting to the point where they say they will not take cases after a certain age because they do not want to deal with the difficult conditions. Dr. Fernald leans the other way and tries to see how many difficult cases he can find in the practice of orthodontics. I do not believe an orthodontist has a right to select his patients. It is a nice thing if you get all easy cases at six or seven years of age in which you can get ideal or normal results. There are men who will not take any other cases. The question arises, what are those people going to do who have unfortunate facial deformities and the malocclusions as shown in this paper? They are entitled to some consideration. As orthodontic specialists we are not living up to our ideals. We claim to have a certain fitness for treating these cases, and if we do not handle them, who is going to handle them? I know from a monetary standpoint these unusual or difficult cases cannot always pay a compensating fee. You may have to work along for four or five years on an individual case, but in the end, if you are satisfied with the results, you will feel that you have been amply paid in the satisfaction you have obtained. Of course, in these unusual cases you do get your pay in the satisfaction that you satisfy the patient. We find these patients are thankful; they appreciate what is done for them. In times past, I have treated several such cases, some of them unusual, such as the doctor has shown, with the idea of seeing what I could accomplish for these people. From a monetary standpoint, I did not make anything. However, I had the satisfaction of doing something for these patients for which they were very grateful. I think the orthodontist has no more right to select his patients than a surgeon has to select his cases. Some surgeons refuse to operate if there is great likelihood of the patient dying because they do not want the death charged to their operation. If the patient had ninety chances out of a hundred of dying, the surgeon should give him the advantage of the other 10 per cent that he has to survive the operation. To operate and do what can be done for the patient is the only proper way.

In the treatment of cases of malocclusion, if we cannot get ideal results, we should give to the patient what we can get in the way of improved masticating efficiency.

In regard to the instrument shown; instruments for measuring the face and movements of the teeth are desirable. As the essayist has stated, we would like to know in what direction and to what extent we move teeth in anterior or posterior occlusion cases. The instrument he has designed to clasp upon the upper molar and measure the movement of the development of the mandible and chin is as accurate as anything you can get.

He spoke of the frontal eminence and external meatus of the ear as fixed points. They are as fixed as you can get in the cranium, the least change being at the junction of the chondrocranium and the face. If you examine the maxillary bones, mandible and facial bones, in a

study of skulls, you will find these bones in different animals are more elastic than any bones in the chondrocranium. You must remember the cranium and face will grow in all directions. You may make measurements of the same individual at two different times and have them vary.

A few years ago I happened to have the pleasure of seeing an instrument Dr. Black designed for measuring the development of the palate and arches. At that time I was quite interested with Dr. Noyes in some work, and we studied the instrument together. I believe there was but one instrument made because Dr. Noyes could not get the same measurements twice in the same individual. He felt the anatomic conditions were such that it was impossible to start out with the idea of a measurement from the palate. I do not know whether Dr. Noyes has done anything with it since. These are some of the difficulties in measuring change and I believe one of the most satisfactory ways of measuring is by the plan which Major Eby and I worked out in taking an impression of the teeth and then inserting it in an impression of the face. We have the teeth in exactly the same anatomic position in the cast as in the face. We can measure from the ear, chin and nose and have a record of it. The same technic has been used by students in later years. The trouble is you have to make so many casts of patients. If you take an anterior or posterior occlusion case and make a facial cast with insert, before you begin treatment and then make a facial cast after treatment, you would have two exact facial casts with the dental apparatus occupying the same position in the casts as it occupied in the patient at that particular time. That is the object we had in view when we worked out that technic, which has lately been improved by Dr. Oliver, but on account of the time involved, I never have worked out a series of record casts that way. That would give an absolute record of all developments of the face in regard to the dental apparatus and would be more accurate than any measurements, because if a patient is fat at one time and in three months is thin you will have a variation in measurements. While we need measurements, the anatomical conditions are such as to make them only approximately, instead of scientifically, accurate.

The President.—Dr. Dewey brought out the point of selecting our cases. This tends to establish the fact that we have not enough orthodontists. If we had more orthodontists, we would not be so likely to select our cases.

Dr. C. C. Johnson, Memphis, Tenn.—I do not know that I have had many of these difficult cases to deal with, hence I do not feel competent to discuss this paper. I feel though, as Dr. Dewey suggested a moment ago, that we ought to take these cases and do what we can for them. If we do not obtain the ideal results that we want, we may get such results as are of real value to these patients and be a real help to them. We ought to do that. I believe we are shunning these cases too much. We are saying we cannot get ideal results later than fourteen years of age, and we do not want to take cases later. There are scores of cases that ought to be treated later than that in which treatment would doubtless bring about improved results to the patient.

I think these cases shown here today will spur a good many of us not to be chary about refusing some of them, especially those of impacted teeth. I think, as a general rule, orthodontists have shunned these cases of impacted teeth. Radiographs make these things apparent, and we should use them more and more. I think it is time for us to take hold of these more difficult cases and treat them thoroughly. We should not hesitate to treat these cases later in life and do what we can for them.

I have a case I began with a good deal of reluctance. The patient is twenty-three years of age. There is so much movement in two of the lateral incisors that I questioned the outcome very much, yet I am treating this case with a lingual arch, and 19-gauge wire, finger springs of 22-gauge, and it is moving just as nicely as can be. It seems to me, I am accomplishing results the same as I do with children nine or ten years of age. I say this by way of encouragement to others to take hold of these older cases. There are so many young people that can be treated, whom in the past I have been turning away, that I must confess I have been doing, for a great many years, what orthodontists have done all over the country. I did not feel as though I could afford to take these cases and fall down on them because my practice was not extensive as an orthodontist; therefore, I thought it better to take only

those cases in which I could accomplish results. Today I begin to feel different about it, and I think all of us should strive diligently to give service in these difficult cases.

Dr. Fernald, (closing the discussion).—I wish to thank you for your kindness in giving me so much time, and for the discussion of the paper.

To me these cases have been interesting. I told those patients in the beginning I could not get ideal results, nor did I think any man could. However, I have never seen a case that could not be improved mechanically or from some orthodontic standpoint. If these patients can pay a reasonable sum, and I can make their lives easier and more comfortable, I think I ought to do what I can for them.

At the Harvard Dental School I have requested them to give to my students all the freak cases they could. I have found them extremely interesting and for each one something can be done. The greatest handicap is we do not get them in time. Their mouths are mutilated and they are too far advanced in age, so that it makes it doubly hard for the operator and the patient.

ETIOLOGIC INFLUENCES OF DECIDUOUS AND ERUPTING PERMANENT TEETH WITH PRINCIPLES OF TREATMENT*

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ONE of the most prolific of the local causes of malocclusion arises through improper care and treatment of the deciduous teeth. A large proportion of the malocclusions which arise from this cause are due to the fact that parents and dentists do not appreciate the imperative importance of preserving the teeth of the temporary dentures up to the very moment when each succeeding permanent tooth is ready to erupt; and they also fail to understand the character of influences which are exerted by the premature loss of one or more of these teeth toward marring the positions and occlusion of the permanent teeth.

The errors of dentists in this field of their profession are so frequent and so serious it would seem that there is a thoughtless disregard of principles which are plainly shown in the natural physiologic processes of secondary dentition, and which no thinking mind can contemplate without amazement and admiration.

In view of the large amount of literature upon this subject, and the competent teaching in the various colleges, showing the importance of preserving the deciduous teeth, it would seem that we should be free from those conditions which frequently confront us, and which must be regarded as caused by a ruthless interference with one of nature's most important provisions.

The deciduous teeth are evidently for the purpose of affording means of mastication during the early years when the full-sized permanent teeth would be all out of proportion in size and appearance for the undeveloped jaws and features. They are there, also, for the purpose of giving nature an opportunity to develop and erupt the permanent teeth, and in bringing them forward in successive and systematic stages, timed according to the needs of general growth and use. They are, moreover, for the purpose of establishing occlusal relations of the permanent teeth and harmonious relations of the facial outlines.

At about five years of age, the first permanent molars commence to crowd their way into the arches between the bases of the deciduous arches on one side, and the rami and tuberosities on the other. Nature, apparently conscious of the forceful influences of this eruptive process toward an interstitial forward movement of the entire deciduous dentures, has provided the deciduous

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molars with broad spreading roots so as to take a sufficiently firm and immovable hold of their surroundings to successfully combat this force, in the same way that will be found with the roots of trees which are subjected to the force of strong winds. Note also, how perfectly Nature under normal conditions has timed this eruptive stage to prevent that possibility which she so evidently fortifies herself against, and at the same time to take advantage of the general developing forces of eruption: Under the needs of increasing age for greater masticating facilities, she starts the eruption of the first permanent molars at a time when the strong phalanx of the deciduous denture is there, or should be there, to resist the forward pressure of these erupting teeth; nor does she commence it before there is nearly enough room by growth for those large teeth back of the temporary set; nor before the alveolar surroundings of the deciduous roots are developed to comparative stability; nor does she wait until the temporary molar roots have become weakened by resorption from the eruptive forces of the premolars.

What could be more prophetic than these provisional acts on the part of Nature in emphasizing the importance of preserving the natural relative position of the bases of the deciduous arches in order that the permanent molars which are destined to establish the occlusal relations of the adjoining permanent buccal teeth will not be allowed to drift forward of their natural positions, since it is upon the established position of the first permanent molars that the relative positions of adjoining buccal teeth are dependent, and also the final occlusion and dento-facial relation of all the teeth. From this we may draw a lesson of the importance of preserving these temporary piers to the future arches until the time of the eruption of their successors, because at whatever stage the arch is long deprived of their support, the permanent molars will surely tend to drift forward to fill the gaps, notwithstanding the restraining influences of perfect interdigitating occluding cusps.

Another of Nature's acts along this line is worthy of the deepest consideration, because it seems to be prophetic of the apparently recognized tendency of the permanent molars to drift forward, and of the importance of preventing it up to the last moment: In the typically normal processes of secondary dentition, when the second deciduous molars are thrown off, the second premolars are ready to prick through the overlying gum tissue, and soon take their places in preserving the integrity of the arch. This is another reason for the spreading of the deciduous roots in order that the resorptive forces of eruption may have an opportunity, without the necessity of extraction, to make a place beneath for the premolar crowns, and thus permit them to erupt as much as possible up to the last moment of their power to hold the required space open. Otherwise, as is frequently seen—especially on the lower—the second premolars are impacted in the dovetailing inclination of adjoining teeth, because of the premature extraction or loss by decay of the second deciduous molars. It may be that this is one reason why the second premolars are the only ones of the permanent dentures which occupy less space than the deciduous teeth that precede them in order, perhaps, that they may have a little better chance to get into place before the drifting tendencies of the adjoining teeth can shut them out.

MALERUPTION OF LABIAL TEETH

From five to six years of age under normal processes, the arches commence to expand in the incisal area in coordination with the erupting forces, and from six to seven years of age, the roots of the temporary central incisors are so completely resorbed that the crowns fall out, or are forced out by the erupting permanent centrals. As these teeth prick through the gums, the cutting edges are commonly in front of the deciduous line, and are not uncommonly malturned. Their disto-mesial widths are so much greater than the deciduous centrals, that notwithstanding the expansion of the arches, there is usually not sufficient room between the deciduous laterals for their perfect alignment at this time. This has frequently led to the premature extraction of the deciduous laterals under the false impression that they were causing a permanent irregularity of the centrals. Whereas, in this very act, one of the important physiologic forces of Nature—the eruptive force—for the expansion of the arches is stopped. The forces of growth are far greater than we are accustomed to imagine; neither can it be appreciated fully, unless one has observed the power which the growth of the roots of trees exert which extend under strongly imbedded cement sidewalks, and which will often break the cement blocks and raise them several inches. With the extraction of the deciduous laterals, and the growth of the arch inhibited, there is soon found to be far less than sufficient room for the permanent laterals, and this leads to the premature extraction also, of the deciduous cuspids, followed by an alignment of the laterals which partially fill the cuspid spaces. Soon after this, or at about eight or nine years of age, the first upper premolars erupt, taking the places of the first deciduous molars. If the deciduous cuspids are not there, they naturally drift forward to partially fill the distal portion of the cuspid spaces, with the tendency also, for the teeth back of these to drift forward, so that when it is time for the cuspids to erupt, there being no room, or not sufficient room for them, they are obliged to force their way through the gums above their proper places, where they have often been regarded by many ignorant people as unnatural “tusks,” and have frequently been wrongfully extracted by dentists as the shortest if not the best means of correcting a deforming irregularity which has seemed to them impossible to correct properly in any other way.

Next in importance to the preservation of the deciduous second molars is the retention of the deciduous cuspids up to the last moment of their usefulness, whatever the apparent irregularity of the incisors; and while the permanent cuspids are very much wider than the space occupied by the precuspids, their wedge-like form impelled by the forces of eruption and natural provisional enlargement of the jaws, will usually enable them to take their places in normal alignment.

Another cause of the maleruption of cuspids is the premature loss of the first or second deciduous molars, which not only inhibits the growth development of the arch in that area, but permits a mesial movement of the first permanent molars which are forced forward by the oncoming erupting second molars. The premolars having also been forced to a mesial malposition, the

cuspid are forced to erupt out of alignment; especially if the deciduous cuspids have been prematurely extracted as frequently occurs in this condition, to give room for the eruption of the premolars.

The maleruption of lower cuspids is not so frequent as the upper cuspids. One of the reasons for this is: the lower permanent cuspids erupt before the first premolars, and consequently are not so liable to be interfered with. However, if the first molars are forced forward of their normal positions by the erupting and fixed mesial malposition of the second permanent molars, the cuspids are the ones which are forced out of alignment, whatever their position or stage of eruption. One can see by the many causes, direct and indirect which so frequently arise, why it is that the irregularity that is characterized by maleruption of cuspids, is one of the most common of all the malocclusions.

By far the larger proportion of temporary dentures are in normal occlusion and in correct dento-facial relations according to age and type, because that is the dominant type toward which the natural biological forces tend. And were it not for maltreatments and certain local and constitutional causes, there would be a far greater number of cases than at present, that would attain to normal occlusion of the teeth.

THUMB-SUCKING

The one cause which most often affects the normal relations of the deciduous dentures is the habit of thumb-sucking, which if allowed to continue into the early years of secondary dentition, will frequently produce all the dento-facial characteristics of an upper protrusion, but with no effect upon the disto-mesial relations of the buccal teeth, except to narrow the arches.

The *modus operandi* of the cause, its correction, and final treatment of the resultant malocclusion, will be found in the Practical Treatment of Division 1, Class I of "Dental Orthopedia."

INFLUENCES OF HEREDITY UPON DECIDUOUS DENTURES

In regard to the malocclusions which arise from heredity, from the simplest to the most pronounced dento-facial deformities, it is somewhat rare that the deciduous dentures and jaws indicate in an appreciable degree the condition which is destined to affect the permanent teeth and more mature jaws. This is because inherited physical dental malformations rarely commence to develop before the beginning of secondary dentition, nor are they often sufficiently pronounced to become apparent before the period of adolescence.

While there are exceptions to this rule, which is illustrated by Fig. 1. showing the plaster models of the deciduous and the permanent dentures of a Class II case at five and eleven years of age, *it is nevertheless true that early interference with the temporary dentures, such as expanding the arches, or the disto-mesial shifting of occlusal relations, is rarely advisable, unless one is sure that the threatened condition has arisen from some definite local cause which the natural physiologic processes of nature will not correct.* If teeth are prematurely lost, threatening maleruption or crowded malalignments, the areas

should be properly expanded and retained for the free eruption of the succeeding teeth. But under other circumstances where the erupting permanent teeth do not seem to have sufficient room and are forced into overlapping malalignments—a condition quite common with the lower incisors—it should be remembered that this is the only way in which nature is enabled to get those large teeth into the small and as yet undeveloped jaws which she is rapidly enlarging by interstitial growth for that purpose. If left to herself as she has been during all past ages when the same character of activities has repeatedly presented itself with results that were nearly if not quite invariably normal, there is no reason to believe that the same results would not now obtain without artificial interference. Besides, anyone of long experience has seen any number of these decided cases of overlapping malalignments of the erupting permanent teeth fully right themselves through natural forces alone.

It is therefore not always necessary or advisable to attempt any artificial preparation for the eruption of the permanent teeth; neither is it always advisable to begin at a very early age the regulation of children's permanent teeth, ex-

Fig. 1.

cept in those cases in which the effects of a local cause still remain, that cannot be corrected by natural forces.

It may be that the habit of thumb-sucking has narrowed the arches and protruded the upper incisal area and retruded the lower, or that the injudicious extraction or premature loss of the deciduous teeth has inhibited the growth development, and contracted the spaces required for the aligned eruption of the permanent teeth, or it may be that it is one of the many threatening malocclusions which arise from adenoids or nasal stenosis. Under such conditions, the early regulation of children's teeth is always admissible and advisable, and should be accomplished with the most delicately constructed appliances for both movement and retention. Furthermore, there should be a definite understanding with the parents that the operation is intended to place only the erupted teeth in corrected positions, for the purpose of permitting the free eruption of the remaining permanent teeth.

One of the greatest objections to the early regulation of children's teeth, is that we usually have them on our hands up to and through the eruption of the second molars; while the little ones up to nine or ten years of age could be running free and building up stable conditions of future health, and while,

moreover, the operation in many instances could be far more easily accomplished for everyone concerned by commencing after the eruption of the premolars—except of course in those cases where simple demands are imperative.

Another phase of this branch should not be forgotten: It has reference to the early disto-mesial malrelation of the first permanent molars whose correction must be determined, as before explained, by the character of the cause. If seen to be purely local, correct by all means, but do not be in haste to correct if there is any doubt that the cause may be an inherited protrusion, upper or lower.

A LOCAL CAUSE OF PROTRUSIONS

Before leaving the subject of secondary dentition, one of its greatest lessons cannot be too often repeated. This relates to that large majority whose permanent teeth are, or would have been, normal in occlusion and dento-facial relations in all instances, had the deciduous teeth been preserved, or retained according to nature's requirements. With these naturally normal conditions, if the loss of deciduous teeth has permitted the permanent buccal teeth to drift forward, ever so slightly, from an otherwise normal dental and facial relation in the arch, and the front teeth then erupt in alignment, *an abnormal protrusion of the facial outlines will be exactly in proportion to this movement.* If the extent of this mesial movement is sufficient to carry the crests of the cusps in front of those of the occluding teeth, a full mesial malinterdigitation of the upper cusps is inevitable. This shows how from premature extraction, or unnecessary loss of deciduous teeth alone, protrusion of the permanent teeth may arise, and though in amount it but slightly changes the facial contour, it may be sufficient to mar the expression of an entire physiognomy. When this occurs with both upper and lower dentures, as at times it no doubt does—all of the teeth having been forced forward of their normal position, and with a possible preservation of normal occlusion and alignment—it is a most unfortunate affair, because people in general, and among them dentists of renowned ability in orthodontia, seeing these perfect conditions of normal occlusion, interpret the facial imperfections which have resulted from this local cause, as inherent, or one intended by nature, and as perfect as it is possible for that individual.

We hardly imagine that in the many faces we meet, there has occurred during their childhood days a thoughtless or ignorant disregard of important principles in the treatment of the deciduous teeth, which has resulted in an unnatural and unnecessary protrusion of the permanent teeth, slight or great, over the upper or entire dento-facial area, characterizing the features, producing unesthetic expressions, and marring those perfect facial outlines which nature would have produced had she been permitted, or aided in having her way.

COMPARISON OF CHILDHOOD AND ADULT PHYSIOGNOMIES

The common normal peculiarity of childhood physiognomies, between the ages from six to twelve, is that of a slight protrusion of the upper and lower lips in relation to the other undeveloped features. By association, we intuitively

tively and unconsciously accept this appearance in late childhood and early youthhood without a thought of facial imperfection. And yet were we to analyze the facial outlines of these young people from the artistic viewpoint of the adult perfect outlines, we would find that a large proportion are similar to that which if seen in adult life would be truthfully denominated bimaxillary protrusion.

This is due to the fact that the teeth are the only parts of the body which do not grow larger than their first formations; and therefore during the development and eruption of the adult sized permanent teeth in the small jaws of childhood, where they are crowded in one upon the other, in their different stages of development, they necessarily expand the dental and alveolar arches prematurely, during the stage of secondary dentition; and as the entire maxillary and other facial bones do not keep pace with this rapid development, the lips are unesthetically, though naturally, forced forward in their outlines, all of which the ultimate growth of other parts finally harmonizes.

By continued observation of the development of childhood and adolescent features, one will frequently see, even as late as twelve years of age, prominent mouths and apparent receding chins, that at seventeen or eighteen years of age will entirely disappear. This goes to prove that which the author has endeavored to emphasize in other chapters, that the bones which characterize physiognomies do not always begin to show at twelve years of age that which is destined by the dominant strains of heredity to characterize the features during later adolescence.

The author remembers a mate of his school days who at twelve years of age was smaller than the other boys, with effeminate features and small nose like his mother's, but who at twenty years of age was six feet tall with large angular strong features and prominent Roman nose like his father's more dominant type.

THE RELATION OF THE GENERAL PRACTITIONER TO THE SPECIALIST IN DENTISTRY*

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AT perhaps no time in the world's history have there been so many and so important changes as are taking place at the present time. At no time has it been so necessary for men almost daily to readjust their ideas and to bring them into harmony with those changing and changed conditions. The world has grown very much smaller than it was even twenty-five or thirty years ago. What with wireless telegraphy, Atlantic cables, wireless telephones, and the great advances that have taken place in science and practice, knowledge has increased to such an astonishing extent that no man can hope to be even fairly conversant with all the current thought of the day. While the world has grown smaller, knowledge has increased. The research work of the past few years has resulted in the development of science that would have been looked upon a few years ago as nothing less than marvellous, and it is quite impossible for any man to possess even a tithe of the knowledge which is available at the present time. It is quite impossible for any man in any of the professions to master all the knowledge of the profession or calling in which he finds himself. Take the profession of law, for instance.

The discovery by Harvey of the circulation of the blood caused the practice of medicine to become a very much wider thing; and then, in comparatively recent times, the work of Pasteur and Koch and Lister gave a new impetus and a broader and wider field to medicine. When they discovered the fact that disease was due to certain microorganisms or pathogenic organisms in the blood stream, they threw a new light upon the whole question of disease; for before that, you know, it was thought that there were certain fluids in the body, and that a lack of harmony or balance in these fluids was the cause of disease or discomfort. More recently another discovery has added greatly to the wealth of knowledge in medicine—the discovery of the x-ray by Roentgen.

Now in many instances we can diagnose by using the x-ray to discover the conditions while the disease is still working in the patient; and that has added greatly to our knowledge.

Growing out of this increased knowledge and this decreasing size of the world, there has come into existence a motto that you find in nearly every business, especially in commercial businesses, and that motto is premised or contained in the two words, "Maximum efficiency." Now, what do these two words mean? Simply this: the greatest possible output for the least possible

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expenditure of time and energy. So we have our commercial experts in every large industry, trying to bring about that condition of maximum efficiency.

Now, what is the result of these changes that have come to the world? I think the result is seen in the fact that while there is an increase in output, that condition has practically brought about the death of initiative. In the days when a man made a pair of shoes, doing all the work himself, he put his own ideas into the work. When a man made a carriage, he put his own ideas into the building of that carriage. But now no one man does more than a small part of the work; he is simply a part of the machine, and the research work, the individual work, is left to the master minds. Years ago that same thought was expressed by Goldsmith when he went through Europe on foot, looking at the conditions of the various peoples in that part of the world, and when he put into his poem, "The Traveller," these words:

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates and men decay."

To some extent, as the result of this attempt to bring about increased efficiency and output, men are decaying. But, happily, Goldsmith wrote another line in that poem:

"Those who think must govern those who toil."

It is true today, notwithstanding the labor unrest, that brains are greater than hands; that every action must exist first as a mental conception. So we ought to bear this in mind, all of us.

Referring again to medicine, you will remember the conception we all had of the old doctor who attended to us and our families. We would say that he knew our constitutions; he combined in himself the various specialties of the present day; he was the only specialist that was known. He was essentially a man who administered medicine, following the old line of the desire to restore that balance in the fluids of the body; and he administered medicine internally, hoping that this would be brought about. He was the physician, the surgeon, the obstetrician, the gynecologist, the oculist, the aurist, the neurologist, the psychiatrist, and the alienist. Now we have added a few more; there is the chiropractor, the osteopathist, the Christian Scientist—and the whole field has been divided and subdivided until it is almost impossible to differentiate between the many specialists of the present day. It is true that with the increase of knowledge this division became necessary, but division and subdivision have run riot during the present age. There are certain reasons for that condition. First, there is an unwillingness on the part of man to pay the price for knowledge. To get a wide knowledge means that a man must burn the midnight oil; so men are moving in the line of least resistance. They say: "Instead of trying to cover a wide field and become generally proficient, I will narrow the field of my endeavor and hope to cover it." In that way specialists have grown up. Then there is the advanced standard of living. Men and women today are willing to pay the price for the best goods and the best class of service; men realize that if they call themselves specialists and live up to their calling they can obtain increased

fees for their services, and that has had a great deal to do with the subdivision of medicine and dentistry into various classes or specialties.

As to the specialties in dentistry, possibly the first one is orthodontia. Then we have the pyorrhea specialist; the crown and bridge specialist; then the exodontist; then the prosthodontist; and recently the men who are engaged in pyorrhea work have called themselves periodontists. In fact, there are so many "dontists" that it is only with a good deal of courage, and almost an expression of regret, that some of us call ourselves "dentists."

Now, in my estimation—and I want to discuss this matter frankly with you—many of these subdivisions are absolutely unnecessary. As I see it, there is not room for more than two specialties in dentistry, one the specialty of orthodontia, and the other the specialty of oral surgery. Now this involves no reflection on the men who feel that they have a special aptitude for some particular calling. But it does mean that outside of these two specialties the profession of dentistry is sufficiently limited to enable any man of ordinary intelligence and common industry to give satisfactory service in these various lines, with the exception of the two that I have just mentioned. Why do I except orthodontia and oral surgery? As to orthodontia, the reason is—of course, this is only my own opinion—that the practice of this specialty requires a special fondness for and ability to get along with children. Every man does not possess that fondness and that ability.

Now, the orthodontist carries on his work largely with children, and he must be a man specially qualified to deal with them. Moreover, the practice of the specialty of orthodontia calls for, perhaps, a closer special study than any of the other mechanical branches of dentistry. It calls for a high standard of mechanical ability, a very accurate knowledge of the anatomy of the parts affected, and an absolute honesty of purpose in dealing with the patients and the parents of the patients. The work of the orthodontist is not finished, as in the case of our ordinary practice, in a day or a week, or two or three weeks at the outside; he must carry on the work for years; therefore, it requires a man of peculiar temperament and peculiar ability to practise orthodontia. Then there is another reason: up to the present, at least, I do not think that the work carried on in our schools has been sufficiently broad to enable a man to go out and practise orthodontia as successfully as he could prosthetic or operative dentistry.

In connection with this, as in connection with every other specialty, I may say that no man should go out from college and enter upon the practice of a specialty until he has had at least some years experience in general practice. Now, why? Well, for this reason: the tendency of all specialists is to become lop-sided—that is unavoidable. "As a man thinketh in his heart, so is he"; if he thinks orthodontia, then to him orthodontia is the biggest thing in life. If he thinks pyorrhea, then to him pyorrhea is the biggest thing in life. Then there is the inability of the specialist who has entered upon the practice of his specialty immediately after graduating to see the conditions from the standpoint of the general practitioner. Therefore, in order that he may have the confidence of the men who will send him their

patients, it is necessary that he should have some years at least in general practice.

Now for the case of the oral surgeon—that is, the man who will be able to operate for cleft palate, for hair lip, and for all the deformities that may occur in and about the mouth. Just there we approach the border line between dentistry and medicine, as this latter term is usually used. The question arises: is oral surgery a specialty in medicine or a specialty in dentistry. I have had a number of requests recently from all over the country inquiring whether dentists could come to Montreal and get some special work in oral surgery. Now, that is not possible for a man who is not trained in medicine and in surgery; a knowledge of both, it seems to me, is an absolute necessity. The essential thing in these operations is the condition after treatment and the possibilities of restoration. This demands the services of men fully trained in both sciences, but with their chief interest centered in dentistry. In the final analysis the permanent condition must rest with the skilled dentist. Now, in order to be an efficient specialist in that line, a man must be a general surgeon as well as a special surgeon. You could not imagine a man calling himself a general surgeon if he operated, say, only in cases of appendectomy. You could not imagine a man calling himself a specialist who would only operate for hernia or for hemorrhoids. These men are skilled surgeons, so we must have a man who is versed in the whole field of surgery, and who can make a success of his work if he goes into oral surgery, as Dr. Brophy, Dr. Gilmor, and other men are doing. I hope that in the near future we shall have in all our large cities, such as Ottawa, Montreal, Toronto, and so on, men who are trained and licensed both in medicine and in dentistry, and who will be giving their chief attention to mouth conditions, carrying along their intensive work in the line of dentistry.

Now we come to the question of the periodontist. In my opinion the work of the periodontist should never be divorced from that of the ordinary practitioner of dentistry; I believe that every man should do his own periodontoclasia or pyorrhea work. Now, this does not imply that I think that as good results are being obtained by the men in general practice as by those who are making a specialty of this work. I know that they are not. But it does imply that the man in general practice should be able to give just as good and intelligent service as the specialist, if he is willing to pay the price. On what do I base this assertion? There are many cases where a man is a general practitioner today and a specialist tomorrow. It is quite impossible that all who call themselves specialists should have assimilated a vast store of wisdom or manipulative ability sufficient to cause a wide difference between the so-called specialists and the man in general practice. On the other hand, I do know that many of these specialists who feel a fondness for and a special aptitude in certain lines of work have given months or years of particular attention to certain classes of work before finally making up their minds to adopt this work as a specialty. There is a reason for this. One reason is the necessity for study, and work, and practice, to develop a high standard of fitness. Another reason is the necessity for obtaining a

livelihood while preparing for the transition from general practice to the work of a specialist.

It is no longer possible to treat a case of pyorrhea, or interstitial gingivitis, or Rigg's disease, or trench mouth, or Vincent's angina, or ulcerated stomatitis, or any of these conditions, by whatever name known, with the instruments usually found in the office equipment of the man in general practice, or in the time generally given to such cases. In altogether too many cases, such service is still too closely linked with the old idea of "cleaning a set of teeth" and with the old fee of fifty cents or a dollar.

There is another reason why the specialist is able to command a respect and a fee out of all proportion to that enjoyed by the men in general practice. Go to the office of any of the men in the various specialties, and then go into the majority of offices of the men in general practice, and you will discover for yourself many of the reasons for this difference of respect and appreciation. Our men in general practice must lay seriously to heart the conditions of the office, their nearness to approach to aseptic conditions in all their operations.

One of the best known dentists in this province, a man known to every one of you said to me a good many years ago: "I should not have been a dentist. I have not one single, solitary mechanical idea in my mind. I do the thing that I have been taught to do until I become fairly proficient in that thing. I continue doing it the same way until someone tells me of a better way; then I try that better way. But I have never been able to offer anything original myself." Well, that man is one of the most successful dentists we have—why? Because of his suavity of manner, his courtesy, his culture of mind, and because of the way he has always kept his office in the city in which he practises. As I have intimated, he is perhaps, one of the most successful practitioners in the province at the present time.

There is a great need at the present time for a revival in study, so that the men who have been out of college for some time may have a chance to come in contact with recent discoveries in histology, pathology, and bacteriology, and with the variations in treatment made necessary by these discoveries.

I do not know whether you had here within the last two years, or perhaps within the last year, a man who was giving instruction in nerve-blocking and in conduction anesthesia. I do not know whether Dr. Smith has been here or not. I took his course in Toronto—not that I hoped to use it, but simply to keep in touch with the work and for the purpose of teaching students in the hospital. Then I took his course when he came to Montreal. Now, why did Dr. Smith meet with the success which attended his work everywhere he went? Simply because he was breaking virgin soil. The men whom he was teaching had practically no working knowledge of the anatomy of the head and face and neck. They had no idea of the area that would be anesthetized by the injection, say, into the infraorbital foramen, into the mental foramen, into the anterior and posterior palatine, into the mandibular foramen; so the great part of his work was simply that of teaching the minute anatomy of these parts upon which they were working. So much have we laid that

to heart that in McGill at the present time we are laying emphasis on that part of our teaching of anatomy. I think it is very important that a man should have a knowledge of the brain centers from which the nerves rise, their position in the brain, the parts of the anatomy supplied by the brain, the part that will be anesthetized by making an injection into any one of these nerves, the depth of these foramina from the surfaces, the length of needle necessary, the part that will be anesthetized.

I received a circular this week from a man who proposes to give a post-graduate course in the surgical extraction of teeth. Now, I think something of that kind is due at this time. Most of us have been extracting teeth in a manner which is anything but surgical. I think that a great advance is due, and can be brought about in this line. This man is giving a post-graduate course of four days for the modest sum of \$200. Now, that looks like a good big fee. We gave Dr. Smith \$1,800 for a week's work in Montreal. That looks like a good deal of pay for a week's work, but he was months and months down in Alabama, where there is no anatomy law, and where he could sit at the bedside until the patient died, call for the body two minutes afterwards, and prepare his specimens. He spent months down there doing work for which he did not get anything. So that if these men do qualify to give that kind of service which will enable you to go out and do better, why, we can afford to pay them a fairly good fee for the service they give.

This need of study is being supplied in many places by the study classes organized by the dentists in many American and Canadian cities. The method of conducting these splendid classes is as follows: a number of men form a class to study some phase of the regular work. After the fullest investigation these men divide the work into various steps, each member of the class becoming responsible for only one step in the operation, and doing this step so frequently that he becomes expert in it, and learns all its advantages and disadvantages, its easy parts and its difficult parts. So classes have been formed in prosthetic restoration, in the technic of inlay work, in conductive and block anesthesia, in the treatment of pyorrhea, in removable bridge-work, in partial denture work. Recently Dr. Nesbit, of Boston, gave a course of instruction in cast clasp work, setting forth what I believe to be so far the most suitable way of making restorations that the profession has yet learned of, getting away from the necessity of grinding down and mutilating teeth in order to put on shell crowns.

In order to keep abreast of the times it is quite necessary that many of our dentists should obtain a new perspective of their relation to their patients, to themselves, and to the profession. It is simply impossible for any man to keep abreast of the times without stated periods for study and observation. It is just as necessary, if a man is to attain to his own full stature, that he should spend a certain amount of money every year in study, in travel, in coming in contact with his fellow practitioners, in order to keep in touch with the newer developments, as it is that he should spend money for coal, or groceries, or clothing, or material, or for instruments for his office.

Indeed, his ability to buy the things usually spoken of as the necessities of life will probably be in direct ratio to the time which he spends in study and improvement, because the latter expenditure will immeasurably increase his earning ability.

Specialists are here to stay. Some men are criticizing them. Some who are suffering financially are finding fault. Most thoughtful men in the profession recognize the fact that a further subdivision would be a calamity, and that even some of those already in existence should revert to the general practitioner, whence they sprung.

In the final analysis, dental service is on a par with the bulk of commercial commodities. It is a question, not only of supply and demand, but a question of the excellence of the thing purchased. The whole world knows today the value of mouth hygiene, as well as the value and importance of a well-kept set of natural teeth. Because of this knowledge, those who can pay for dental service are going to have that service from the man who can render service of the highest standard, and that, in many cases, regardless of the fee that may be charged.

The important thing for each one of us to consider is this: Am I capable of rendering to my patients as good service in the field in which many men are now calling themselves specialists as are the so-called specialists, or, if I am to be honest with these patients, must I send them to some other man, conscious that they will receive a standard of service which I cannot personally give to them? The whole question resolves itself into two points—personality and efficiency. I thank you. (Applause.)

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE USE OF THE CHISEL AND Mallet IN THE EXTRACTION OF TEETH*

BY BOYD S. GARDNER, D.D.S., ROCHESTER, MINN.

Section on Dental Surgery, Mayo Clinic

IT IS very apparent that a great change is taking place in the technic of removing teeth, and it is obvious that this change is due largely to the reason for their extraction. No doubt for many centuries teeth were extracted for the sole purpose of eliminating the immediate pain with little or no consideration for the trauma produced or the postoperative pain and discomfort, and, therefore, an instrument that would remove the teeth was considered quite satisfactory. Today the attention of the dentist is directed to instruments that will make it possible to remove a tooth in its entirety with the minimum of trauma and at the same time remove all pathologic conditions.

In the selection of instruments, the thought of safety to the patient should be the first consideration. Are certain instruments and the technic employed in their use safe? Can the beginner make use of them without risk to the patient and successfully?

The use of the chisel and the mallet to extract teeth does not follow a principle that is new to the dentist. Undoubtedly the technic of gold foil work which the dentist learns while he is a student teaches him control, and the gold plugger with the mallet, which has been the technic of choice, demonstrates to the student that he is employing a technic and making use of instruments that at all times are under his control. Consequently, in teaching the student to remove impacted teeth and other teeth difficult to remove, he soon becomes confident not only of success so far as removing the tooth is concerned, but also confident of the safety of the procedure.

The stone cutter in cutting a letter in a piece of stone makes use of a mallet that meets his chisel at a right angle and thereby obtains a uniform

*Presented before the American Society of Exodontists at the meeting of the National Dental Association, August, 1920, Boston.

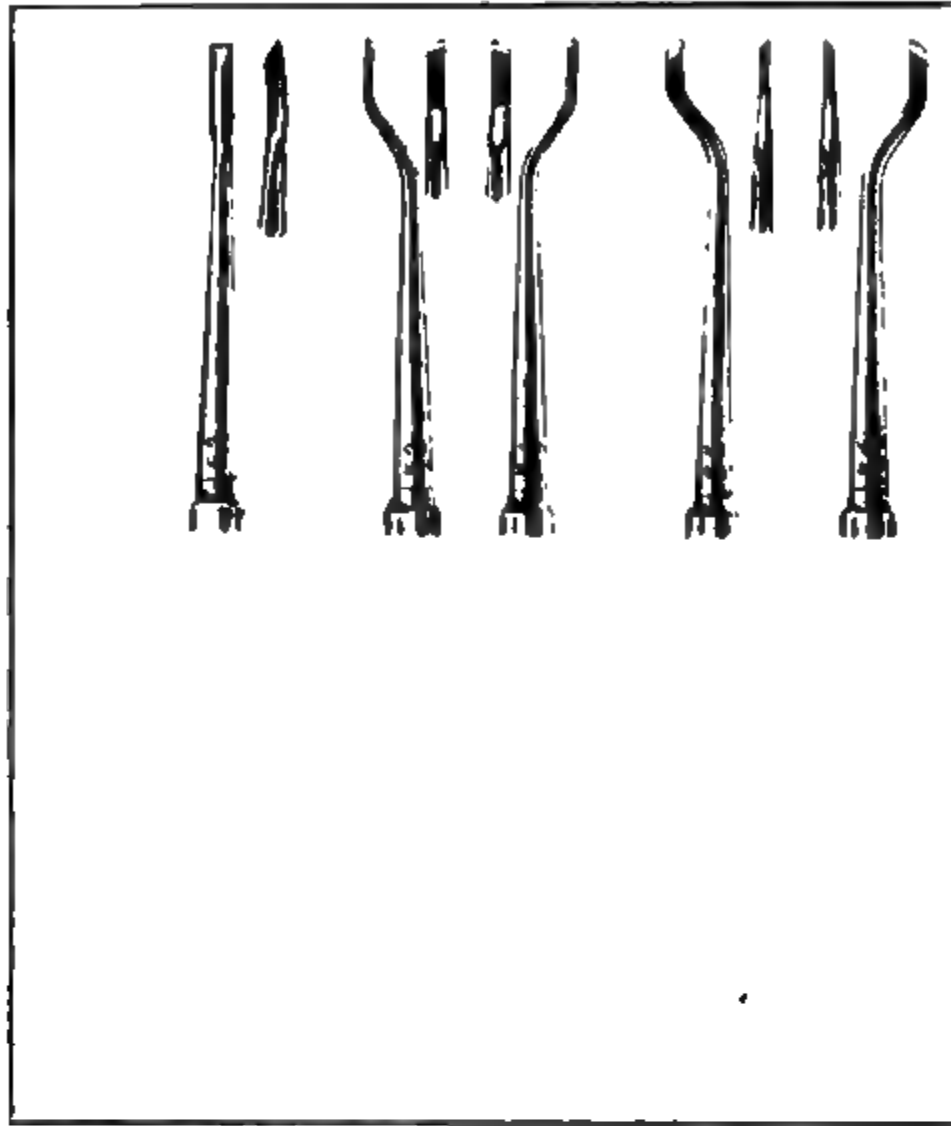


Fig. 1.—A set of six chisels which are used with the mallet in the extraction of normal as well as impacted teeth.

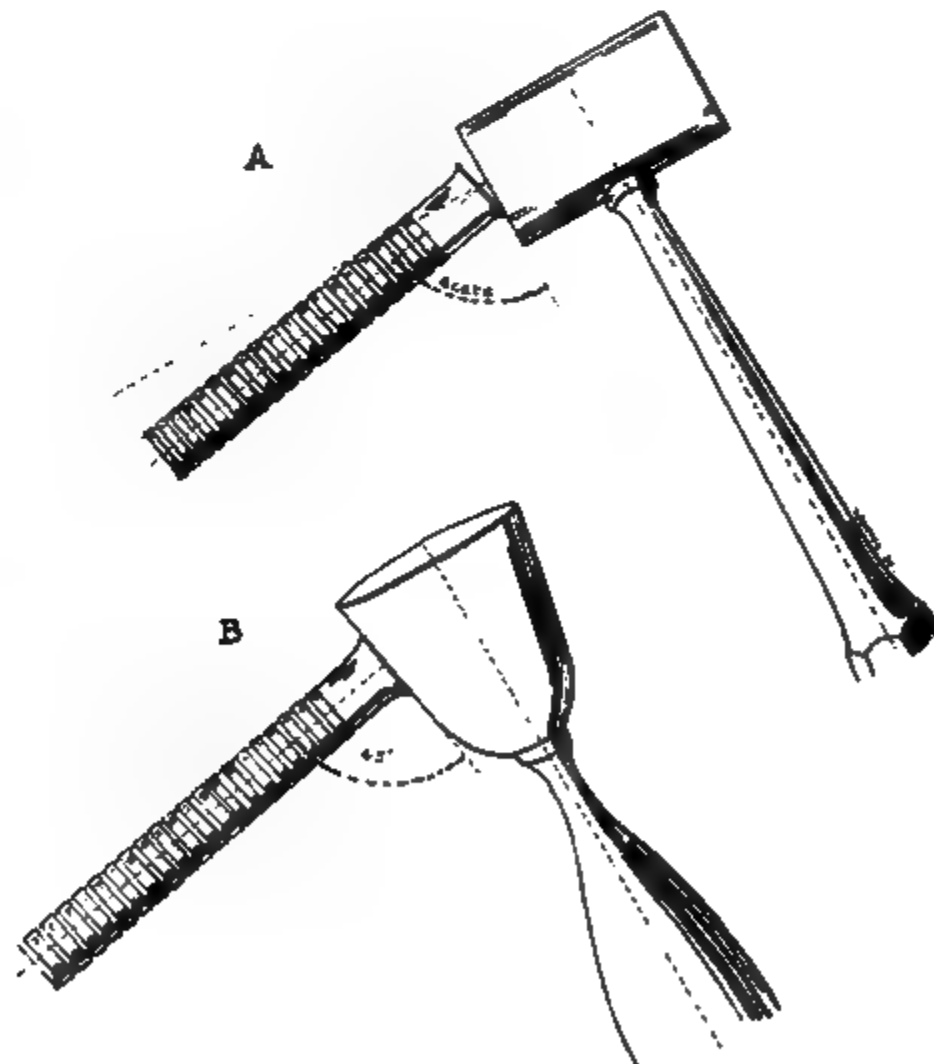


Fig. 2.—The two types of mallets. *A*. The chisel is not receiving the full value of the mallet since the mallet does not meet the chisel at a right angle. *B*. The chisel being hit at a right angle and the instrument receiving the full value of the blow.

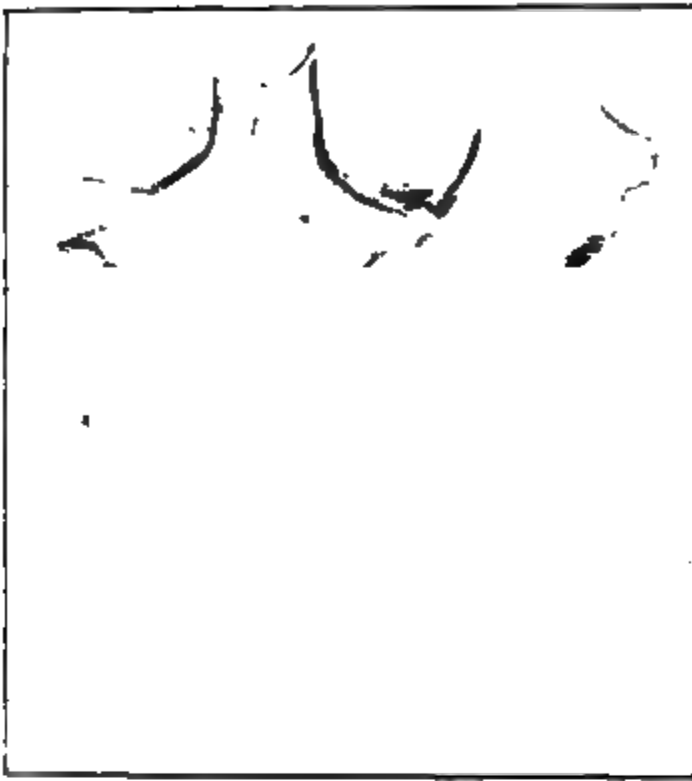


Fig. 3.—A result not unusual when the forceps has been used to extract the superior first molar. Note the loss of process of the adjoining teeth.

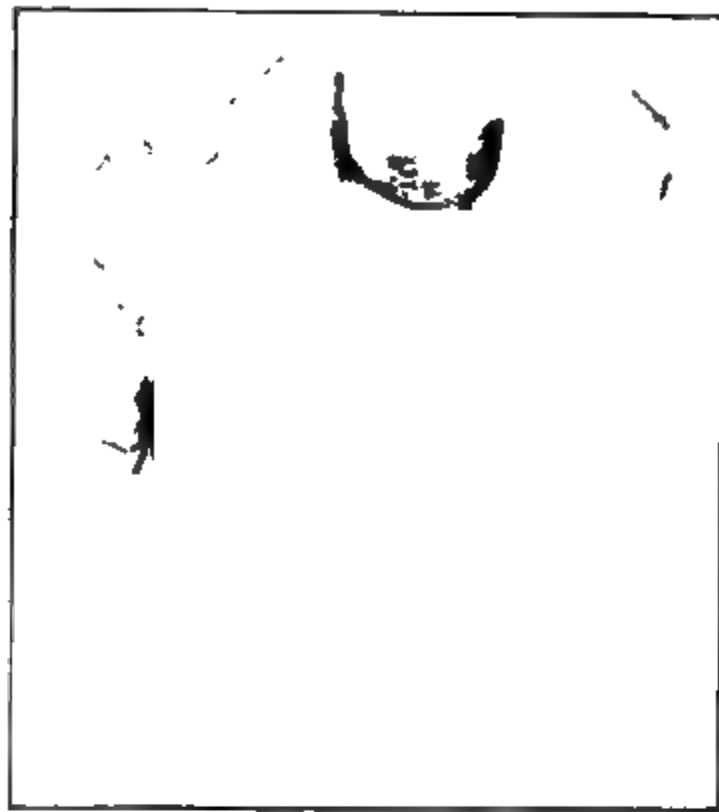


Fig. 4.—A result of the chisel technic in removing the superior first molar without fracture of the process or injury to the adjoining teeth.

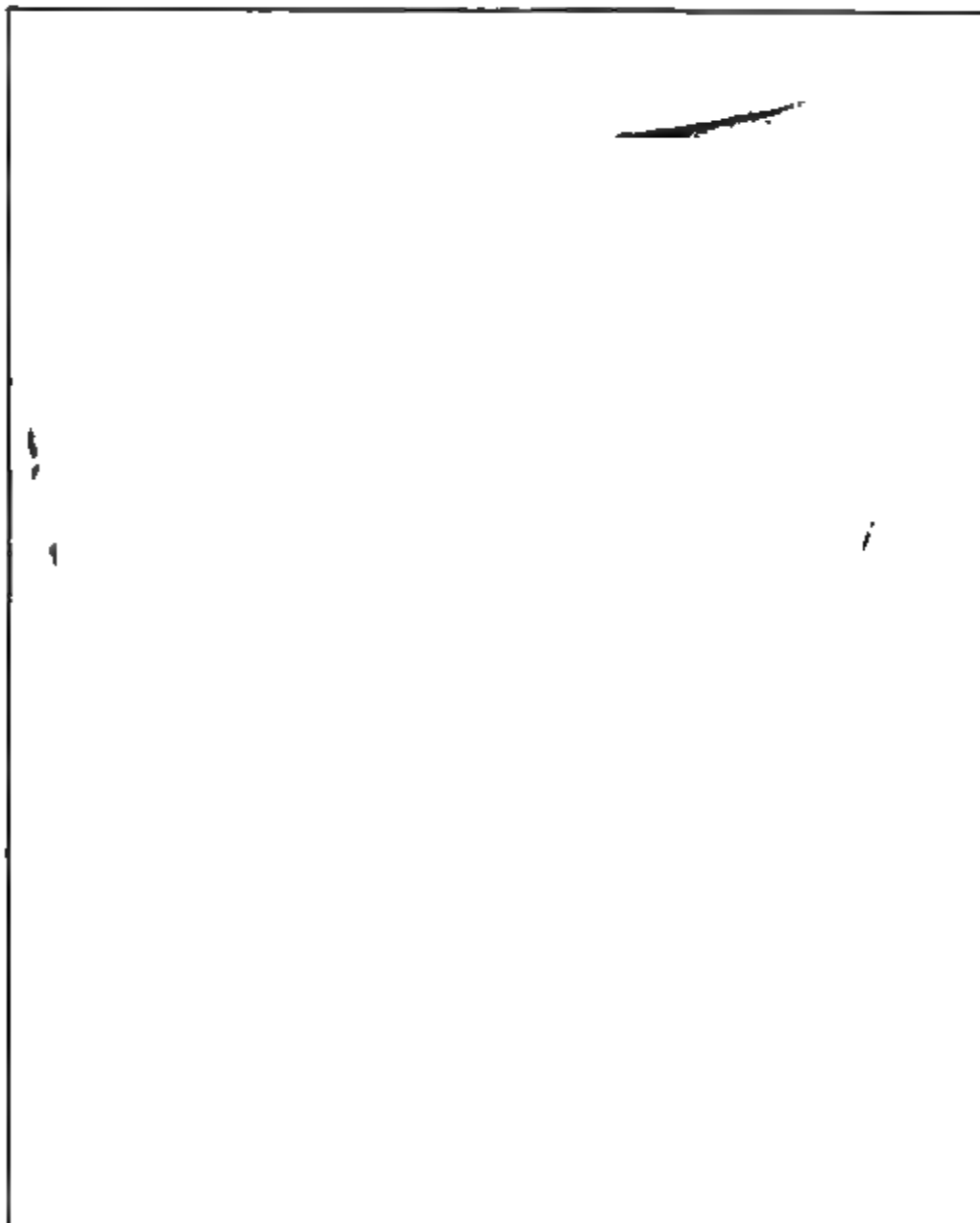


Fig. 5.—The use of Chisel 52 with mallet. This instrument is used more often than the other five for removing normal and impacted teeth. The buccal plate is being removed from the roots of the two upper bicusps.

and controllable force. In order to be successful in cutting a letter he must be able to stop the chisel at any point so that the letter may not be overcut. Similarly, the surgeon in performing a radical operation on the mastoid, does not employ hand or arm pressure to drive his chisel, but makes use of the mallet, for a slip in his work might mean a fatality.

In selecting chisels an effort has been made to find narrower instruments since the blow necessary to drive a wide instrument is much too severe and tends to increase trauma (Fig. 1). The weight and shape of the mallet is also considered. With the usual type of mallet the chisel is rarely hit at a right angle either by the operator or the assistant. Accordingly a type of mallet that is more or less new to the dental profession has been tried with a great deal of satisfaction (Fig. 2). This type of mallet is centuries old to the sculptor and stone cutter and now is used by the orthopedic surgeon. With it instruments always may be struck at right angles and the full volume of the blow thereby realized; the operator may hold the chisel without the usual tight grip and the resulting cramp in the hand.

Fig. 6.—The use of Chisel 55 which is shown cutting the process at the distal of the cuspid without injury to the bicuspid

Fig. 7.—The use of Chisel 56. The process is being cut at the mesial of the first bicuspid without injury to the cuspid.

No doubt the mere removal of the tooth has been paramount in the minds of many operators, and the treatment of adjoining teeth and post-operative considerations have been largely neglected. The extraction of either a lower or upper first molar emphasizes the points to be considered. We may assume that the average operator has selected his type of forceps for removing the first molar and has been successful in the extraction; this success is the demonstration to the patient of the extracted tooth free from process, since otherwise it is at times difficult to convince him that the jaw is not fractured. Such extraction usually is accomplished by forcing the tooth from the buccal to the lingual until the socket either is enlarged sufficiently or the buccal plate fractured in order that the tooth may be removed. In such a procedure have the two adjoining teeth and the postoperative results been considered? A result which is not unusual is represented by Fig. 3; it is very apparent that the adjoining teeth have been robbed of sufficient osseous tissue to make it impossible for them to return to normal. Not only are

the adjoining teeth affected but the sockets are left in a condition that would not follow a well performed operation. Fig. 4 allows a comparison of the forceps procedure with the chisel and mallet technic. In this case the buccal plate has been removed in such a manner that not only the two adjoining teeth are left undisturbed, but the edges have been cut so that it is possible to get the maximum of regeneration, if the soft tissues have been properly considered. When the buccal plate is removed the tooth is easily removed without the slightest pressure to the lingual, and only in very unusual cases is it necessary to cut the buccal roots in order to extract the upper first molar with the greatest amount of ease.

In Figs. 5, 6, 7, 8, and 9 the different steps in the operation are shown and they demonstrate the use of the different chisels.

If the tooth has a granuloma at its apex it is obvious that the granuloma may be removed without any chance of leaving a part of it.

Until the last few years the use of the chisel and mallet has been more or less limited to the extraction of the impacted or otherwise malposed teeth.

Fig. 8.—The use of Chisel 51. This instrument is used only for cutting the process between the roots of the two teeth to be extracted.

Fig. 9.—The usual result after the removal of the two superior bicuspids with the chisel and mallet technic.

However, their use in removing teeth with definite pathologic conditions has been emphasized by Novitsky, Shearer, Lucas, Molt, Bosworth, and others.

In the extraction of the impacted lower third molar a definite technic may be carried out under the eye. The osseous tissues are cut away in such manner that actual cuttings can be demonstrated (Fig. 10). It is questionable if this can be accomplished by the hand and arm pressure technic. The tooth is prepared for the use of the elevator with the minimum amount of trauma and without the so-called wedging result. The socket after the removal of the tooth is left in such excellent condition that it cannot be criticized from the standpoint of bone surgery.

SUMMARY

The use of the chisel and mallet for the extraction of normally placed, as well as impacted and otherwise malposed teeth is safe and successful even in the hands of the less experienced operator. With their use, the sockets and the processes in general are left in a condition that will not be criticized from

the standpoint of surgery. The operator using the chisel and mallet technic not only can remove all roots but also attached granulomas and other pathologic conditions.

Fig. 10.—The use of Chisel 55 in the removal of the impacted lower third molar. The cutting point of this chisel is with the long axis of the instrument, and the curvature enables the operator to work around the second molar.

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DISCUSSION

F. F. Molt.—There is not the slightest doubt that opinion is changing vitally with regard to the advisability of surgical procedure in extraction. The operation must be seen to be thoroughly appreciated, but it is entirely rational.

The inadequacy of attempted curettage in the majority of extensive periapical involvements, when the granuloma cannot be seen but must be approached through the tooth socket would seem self-evident. If the area to be curetted is necrotic and not limited by a sclerotic wall, or if the radiogram shows the probability of encroachment upon adjacent anatomic structures, notably the maxillary sinus, the floor of the nares, the anterior palatine foramen in the maxilla or the mental foramen or inferior dental canal in the mandible the desirability of what may be called the "open view operation" becomes imperative.

Then again, when we are called upon to prepare a mouth for dentures, the results obtainable by surgical procedure ignoring the factor of pathology entirely, are so far superior to those from ordinary extraction methods that there is no comparison. Considering those cases of complete extractions where there is extensive pathology the alveolectomy procedure permits of definite and thorough elimination of all these areas with no stirring up or dissemination of infection, thus removing the formidable feature of reaction.

For this type of operation the use of the mallet and chisel is as essential as is the retraction of the tissue flap, for with definite strokes of the mallet one may limit his bone cutting where he wishes. The varying degree of calcification presenting in different subjects is such that the hand pressure that would accomplish extensive cutting in one case would fail to penetrate in another, and when one is compelled to use vast pressure one passes the danger line.

In the use of hand chisels in removing impacted teeth there is not the slightest doubt that some operators can achieve results. It is possible that some cases are considered inoperable by such a technic, but my personal preference is for an operation throughout which I can see what I am accomplishing.

The hand chisel is in no measure self limiting. Consider if you will the possibility of accidental encroachment upon vital tissues. The operator can, of course guard the tissues with the fingers of the other hand at the risk of serious injury to himself, for a deep cut under such circumstances with its possibilities as an inception of infection is not to be considered lightly. With these possibilities therefore, which cannot be ignored, the balance would seem to lie with the more lengthy but more definitely careful operation.

Dr. Gardner is to be complimented upon his paper. Both the position that he occupies and his ability as an operator give his statements weight. He has undoubtedly had ample opportunities for comparing results obtained by each method. A great deal of credit is also due him for the products of of his ingenuity—the chisels and the mallet that he has shown. Although I have had as yet no opportunity to try out this new type of mallet, the mechanical features appeal to me and I shall not be surprised if it will prove to be an improvement upon the ones we have been using.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

SOME SUGGESTIONS FOR THE STANDARDIZATION OF DENTAL RADIOGRAPHY

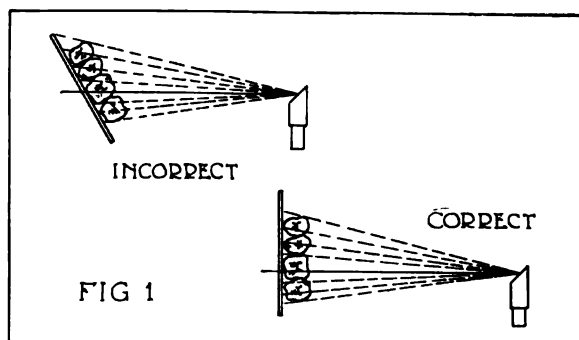
BY A. W. SCHELL AND C. S. SPANGLER, WASHINGTON, D. C.

THE postures used in radiographing the bones and joints have been standardized so that there is no longer any difficulty in this respect in comparing the work of different laboratories. These standard positions are used in practically all laboratories with very few variations. The centering of the normal ray and the angle of the tube have become fixed quantities for the various positions of the bones and joints, but unfortunately the procedure in radiographing the teeth has been left largely to guesswork, or to judgment, and when too few dental films are made to develop this sense of judgment in the technician, it amounts, after all, to guesswork. No definite rules have been adopted whereby good dental negatives may invariably be produced. The reason for this is partly because the importance of demonstrating on the film all the structure of the teeth and the alveolaris has been underestimated, and partly because the visualization of the relations of the film, part, and tube, is somewhat difficult, and also because the idea is prevalent that the angles of the teeth in different subjects are rarely the same. From observations, from the viewpoint of the radiographer, of the teeth of patients differing widely in their habits, mode of life, and age, and experimentation in applying similar technic to all, it has been found that, with the exception of changes produced by advanced pathological processes, such as excessive hypercementosis, or pyorrhea, and in exceptional cases presenting developmental defects, there are a number of factors which are constant to all. It is the purpose of this paper to bring these before the attention of technicians who are engaged in dental radiography as an attempt toward the standardization of dental postures, and any discussion will be welcome to the authors.

There are, then, a number of factors which can be kept constant for every patient, and if the technician will keep them so, much of the guesswork incident to the production of good diagnostic films will be eliminated. These factors will be taken up separately, and may be enumerated as follows:

1. Relative position of the tubestand to the chair and to the patient.
2. The sagittal plane of the head absolutely and constantly vertical.
3. The crowns of the teeth lying in a horizontal line.
4. The crowns of the teeth lying in a line parallel to the axis, or the target, of the tube, except when using the "right angle" Coolidge dental tube, when this line will be perpendicular to the target.

Considering the first factor, the relative position of the tubestand to the chair and the patient, it has been found that it is most convenient to place the tubestand at the right of the chair, so that the tube carriage extends across and in front of the patient's head, with the tube turned so that the ray is horizontal. When using special dental units, this, of course, will not apply, but the purpose in presenting this factor is to aid the technician who



is not equipped with special dental apparatus and must use the regular tubestand. This position for the stand will be found convenient, because it will not be necessary to move the stand during the operations, as the tube may be either raised or lowered or shifted laterally across the face by means of the carriage. Also, the carriage may be swung away from the chair to admit the patient, or to give the operator more room while placing the film.

The sagittal plane of the head is to remain absolutely vertical. If this point is not closely watched—that is, if the head is tilted to either side—the angle of the ray must be changed to conform to the new position, and it would be impossible to state a definite angle for the ray unless the position of the head is kept constant. Therefore, the success of this system will depend upon this point probably above all others.

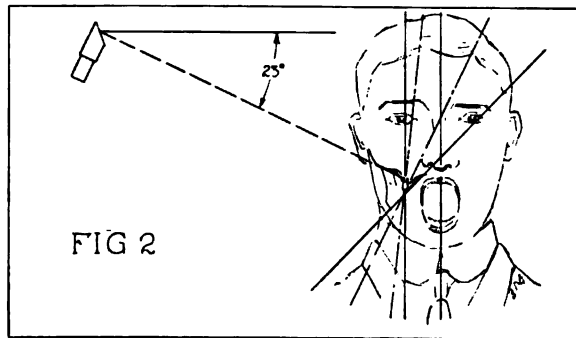
If the crowns of the teeth are shifted out of the horizontal line, the shadows of the teeth will partly superimpose, thus blotting out some of the structures important to accurate interpretation and distorting the relation of the apices and surrounding structures. Furthermore, the clean-cut appearance of the finished film will be destroyed.

For a similar reason this same line (the line of the crowns) must be paral-

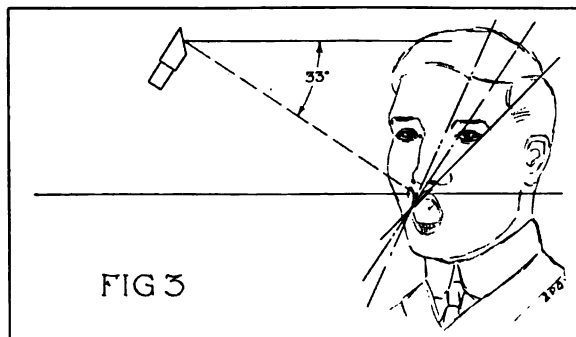
lel to the axis of the tube—that is, perpendicular to the normal ray—for if the head is turned so that the crowns of the teeth lie in a line which is not at right angles to the normal ray, the shadows of the individual teeth will superimpose laterally. This factor must be represented diagrammatically as in Fig. 1.

These four points will remain constant for every patient. Having made these certain, it is possible to proceed with a definite tube angle for each type of teeth, upper and lower, the only indefinite factor remaining to be defined being the points upon which the normal ray is centered in each case.

The following angles and center points have been found satisfactory, it having been necessary to vary them only under very exceptional circumstances:



(Maxillary Molars.)



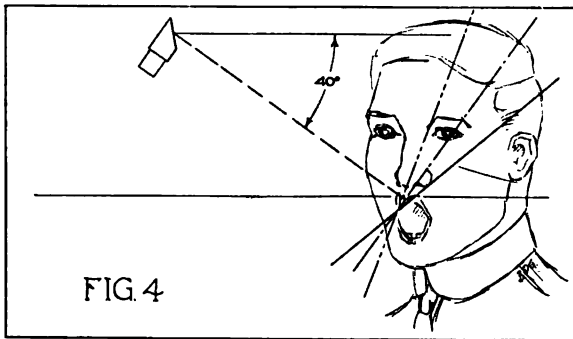
(Maxillary Premolars.)

MAXILLARY MOLARS

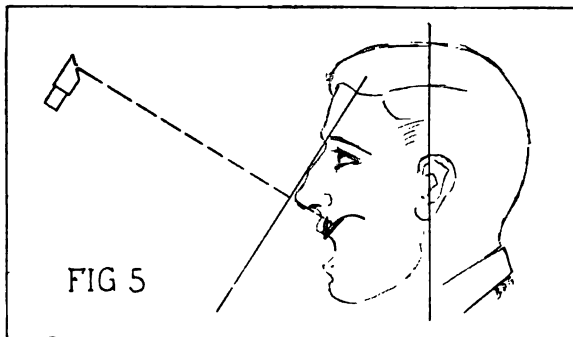
1. The sagittal plane absolutely vertical.
2. The line of the crowns horizontal. This may necessitate tilting the head slightly forward, as, in opening the mouth to receive the film, the head is generally thrown upward.
3. The line of the crowns parallel to the axis of the tube (perpendicular to the normal ray).
4. Tube tilted 23 degrees below the horizontal. (The ray directed 23 degrees downward.)
5. The normal ray centered on the lower border of the zygomatic and over the second molar.

MAXILLARY PREMOLARS

1. The sagittal plane absolutely vertical.
2. The line of crowns horizontal.
3. Line of crowns parallel to axis of tube. This will necessitate turning the face slightly more toward the tube, but care must be taken to see that the sagittal plane remains vertical and that the crowns remain horizontal.
4. Tube tilted 33 degrees below horizontal. (Ray directed downward 33 degrees.)
5. Normal ray centered between the two teeth and on a line with the lower border of the zygomatic.



(Maxillary Canines.)



(Maxillary Incisors.)

MAXILLARY CANINES

1. The sagittal plane vertical.
2. Line of crowns horizontal.
3. Does not apply, but the general line of crowns should be kept as before.
4. Tube tilted 40 degrees below horizontal. (Ray directed downward 40 degrees.)
5. Normal ray centered over the tooth on a line with the lower zygomatic.

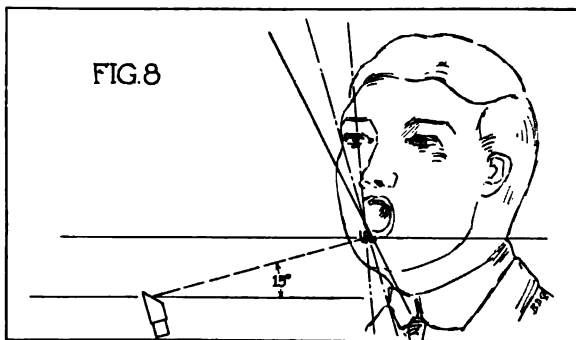
MAXILLARY INCISORS

1. The sagittal plane vertical.
2. Line of crowns horizontal.
3. Line of crowns parallel to axis of tube.

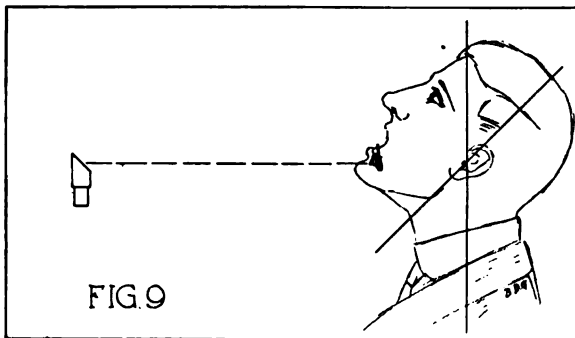
4. Tube tilted 15 degrees above the horizontal (ray directed 15 degrees upward).
5. Normal ray centered over the tooth (at the angle of the chin).

MANDIBULAR INCISORS

1. Body erect, head thrown back to an angle about 45 degrees, mouth wide open.
2. Line of crowns horizontal.
3. Line of crowns parallel to axis of tube.
4. Tube tilted to horizontal. (Ray directed on a horizontal line.)
5. Normal ray centered between the central incisors, at the tip of the chin.



(Mandibular Canines.)



(Mandibular Incisors.)

Although the first three points in almost each case are repetitions, their importance cannot be overestimated, because the success of the entire technic depends upon the strict attention of keeping the sagittal plane of the head always vertical and the crowns of the teeth always horizontal. In order to accomplish the latter in taking the lower teeth it will be necessary for the head to be thrown back considerably, especially when taking the lower incisors. As an aid in retaining these positions a simple form of headrest is desirable, and although it may be dispensed with if the patient is carefully instructed as to the importance of holding the positions, its use will tend to steady the head and relieve the strain upon the muscles. It is, of course, perfectly permissible and desirable to have the patient shift the position of

the body in the chair in order to relieve the discomfort which would otherwise attend, especially where long exposures are necessary, but the operator must be at great pains to see that the relative positions of the head and the tube are not interfered with by changes in the position of the body.

The voltage and current will depend upon the type of apparatus used. A three-inch gap is considered sufficient, backing up a current of from ten to twenty milliamperes. Using this setting, an exposure of five seconds is about an average for upper molars, but the time will vary with the weight, or thickness of the parts. This technic will be satisfactory for use with the regular film, and when extra fast films are used the time will be reduced accordingly. It is found, however, that better results are obtainable with the regular than with the fast films, although the use of the latter may be advocated in the case of nervous or young patients.

It is advisable to use the index finger of the left hand in holding the films on the right side, and the index finger of the right hand for those on the left side, with the thumb for the incisors. The patient should be carefully instructed how to hold the films, and also of the importance of not letting them slip from the position in which the operator places them. The corners of the films should be bent to conform with the soft tissues, to prevent pricking or gagging.

Finally, the entire process should be performed without any evidence of haste, giving the patient time between each exposure to compose himself in a position as comfortable as possible.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Etiology of Open Bite. A. Sulke. Zahnärztliche Rundschau, 1920, No. 44, p. 537.

Open bite is an anomaly of occlusion in which on closure of the jaws only the molars and perhaps also the premolars are brought in contact, while an interval of two to ten mm. is left between the incisors and canine teeth. At the same time, the nasio-mental distance is greater than in the normal profile. The condition was first described by Carabelli, according to whom open bite is also known as "mordex apertus Carabelli." In the formation of open bite, deformities of the upper jaw are of more decisive importance than those of the mandible, the latter may more or less aggravate open bite, but do not furnish a primary etiologic factor, as is sometimes assumed. Nasal stenoses, pathologic conditions in the pharynx with associated mouth-breathing, rickets, macroglossia, habitual sucking of the thumb or fingers, may cause open bite, acting alone or in combination, in conformity with their mechanical action. In those cases in which the above-mentioned factors are not demonstrable, the displacement of dental germs, notably of the molars, below the nasal floor, with a tendency to grow perpendicularly downwards, furnishes an acceptable explanation for the origin of open bite and the associated high and narrow palate. The verticle position of the tooth-germs below the nasal floor can appear in the first as well as in the permanent denture. In the former, on account of the small size, it is not likely to produce a very striking anomaly, but in the permanent denture, the eruption of every additional analogously displaced molar may aggravate the deformity, the bite being totally open from the right to the left wisdom tooth. The following three symptoms are almost invariably met with in cases of open bite: (1) Mouth-breathing; (2) an obtuse mandibular angle; (3) hypertrophy in the molar region. These conditions are sometimes erroneously regarded as the cause of open bite. Careful examination of individual cases and prolonged observation is the only way to ascertain the etiology in a given instance. Open bite may become aggravated through secondary factors, extraction of teeth leading to constriction of the jaw, especially when done on the milk denture.

Orthodontic Limitations. F. C. Kemple. *The Dental Cosmos*, 1920, lxii, No, 11, p. 1327.

The author cautions against considering the accomplishment of so-called ideal occlusion, as obtainable by means of practical orthodontia, in the great majority of the cases. In his experience with malocclusion, the greatest difficulty was usually encountered in determining the cause, and the best manner of its removal. The final results rarely measured up to the ideal standard. It is a mistake to regard ideal occlusion as the normal occlusion, and another to assume that slight variations from the so-called normal require correction. The experience of men who have had from fifteen to twenty years of orthodontic practice, and who possess unusual technical ability, is to the effect that they have no assurance of ideal results from their treatment; the ideal aimed at being attained only in exceptional instances. Their findings agree with the author's own, for he could recite many cases in which he was unable to secure an ideal overbite, and many others in which he could not establish an ideal mesio-distal interdigitation of the molars and bicuspid *on both sides of the mouth*. In other cases, he did not succeed in producing a *permanent* alignment of the upper and lower incisors and cuspids, no matter if the treatment were begun at the early age of five or six years, or put off until the age of nine or ten. Such results should not be classed as orthodontic failures, however, but in the author's opinion represent only natural orthodontic limitations. They are imperfect only in the sense of not complying with a false and arbitrary standard. In all anatomy, the *normal* embraces a wide range of variation, and the human mouth is no exception to this general rule. There is no such thing as perfect symmetry in nature. Under these conditions and with the unfavorable prognosis for the average case of malocclusion, it seems most ill advised for the orthodontist to attempt the correction of every slight malocclusion that is presented in practice. In many of these cases it is dangerous not to "let well enough alone."

Complicated Eruption of a Lower Wisdom Tooth. G. Maurel. *La Revue de Stomatologie*, 1920, xxii, No. 9, p. 509.

The patient, a young woman twenty-one years of age, presented a muscular deviation of the lower jaw towards the right side, the trouble having begun with severe pain in the region of the ascending ramus of the right mandible and in the right auricular region, followed by swelling of the cheek, tight constriction of the jaws, and persistent otalgia. On account of the swelling in the parotid region, the diagnosis of mumps was rendered but was found to be erroneous after the patient had been kept under observation for twelve days. At this time she was first seen by the author, who in spite of a somewhat negative examination of the dental system assumed the existence of a noninfectious reflex parotiditis of dental origin. The extraction of some roots was followed by very gradual improvement of the symptoms, but a certain degree of induration persisted under the parotid swelling. When the patient opened the mouth, the lower jaw became very markedly deviated towards the right side, suggesting an infectious or reflex contracture of the masticator muscles of the

right side, more particularly a functional disturbance of the masseter muscle. Radiographic examination showed an almost completely calcified lower wisdom tooth at the level of the alveolar margin in the region of the maxillary angle; this tooth was bent slightly forward, the biting surface being no longer in contact with the bone, but only with the mucosa. There was a somewhat darker zone around the crown, suggestive of an infection of the pericorony sac. Repeated instrumental examinations now showed that the wisdom tooth was actually accessible by the endo-buccal route and that a very fine passage seemed to exist in the gingival mucosa. The etiology of the trouble was thus explained as due to abnormal development of the right lower wisdom tooth, infection of the pericorony sac, and remote disturbances of the right masseter muscle and the parotid gland. The glandular swelling was presumably of reflex origin and connected with the infection originating at the level of the wisdom tooth. The treatment to be recommended consists in the extraction of the wisdom tooth responsible for the train of symptoms.

Origin of Dental Configuration. G. Aichel. *Anatomischer Anzeiger*, 1920, lii, No. 19, p. 417.

The shape of the teeth is not influenced by the food, but it governs the selection of the food. Similar dental configurations do not always correspond to a similar mode of nutrition, and *vice versa*. The tooth does not alter its shape in the period of function. It is purely theoretical to assume a transmission of functional stimuli through the cells of the dental pulp to the germinal cells and a response to these stimuli through changes of configuration in the succeeding generation. The causes which determine the change are unknown, but two principal factors are active in this connection, (1) mechanical influences in the environment of the tooth-germ, which may lead to changes of configuration in the presence of hereditary fixed shapes of teeth, as well as in the absence of such heredity, resulting merely in arrest and inhibition shapes in the first group of cases; (2) the capacity of variation of the fundamental tissues composing the tooth-germ involves the potential development of an infinite variety of dental forms. Changes in the configuration of the teeth lead to a modification of the animal's food.

Teeth Must Have Exercise. U. S. Public Health Service, 1920, Washington, D. C.

In connection with the relation of food to good teeth, the influence of exercise must be kept in mind. Regular use of the teeth for chewing helps to make stronger and better teeth. The food should therefore be presented in such a form that it will require chewing. For this reason the diet should include a certain amount of coarse material, especially designed to strengthen the teeth. Coarse whole-grain breads, hard tack, baked potatoes, eaten with their skin-jackets, fresh apples—these and similar articles included in the food will help to make good teeth. The two most important elements needed in the diet for building sound teeth are lime and phosphoric acid, and for the growing child there is not a better source of these than milk. In addition to

this there should be other sources of mineral salts, such as fruits, green vegetables, and pure water.

It is not a matter of coincidence that in the Presbyterian Hospital in Chicago, out of 332 patients who were suffering from severe rheumatism and joint trouble, 89 per cent were found with chronic abscesses of the teeth, or that at the Cook County Hospital, Chicago, 76 per cent of the rheumatic cases were found with chronic abscesses of the teeth. There is strong reason to suspect that mouth infections may often be the cause, or at least a contributing cause, of many diseases, such as tonsillitis, articular rheumatism, St. Vitus' dance, certain forms of heart and kidney diseases, and obscure stomach ailments.

Gangrene of the Roof of the Mouth During Influenza. Ritter. *Zahnaerztliche Rundschau*, July 6, 1920, xxxix, 27.

A man of 35 entered the author's office with the following picture of disease: all of the upper front teeth were involved in a marked stomatitic process. The incisors and canines were loose and the gum corresponding to the incisors was greatly puffed up and much pus could be squeezed from it. The hard palate was the seat of a severe necrotic process studded with whitish, rounded nodules and ulcerous loss of substance. Perhaps a third of the hard palate was involved on both sides. There was absolutely no similarity to ordinary stomatitis ulcerosa. The whole process had begun about 8 days before consultation. Patient had been taken with chills and fever while at work and had been compelled to seek medical advice—diagnosis of the physician, influenza. The gripal symptoms had passed off leaving the present condition in the mouth. Two teeth (incisors) were drawn and the necrotic mass curetted after which a sound readily penetrated the rotten tissue of the hard palate for 3 cm. The entire raw surface was painted with iodine tincture. After several days without improvement, in which the patient was becoming weak, a surgeon was called in. Before a microscopic examination to exclude malignant disease could be completed the patient sank and died of sepsis. Whether the condition could be regarded as an anomalous form of noma is not debated but it seemed to have been parallel with that affection, occurring in connection with an infectious disease and pursuing a rapidly fatal course.

Submaxillary Adenites of Dental Origin. Landetey Arago and Mayoral. *La Odontologia*, April, 1920, xxix, 1.

The four lower incisors correspond to the submental glands. These comprise nodes *a* and *b* and of these node *a* is also in relation with the lower canines, premolars and first molar while node *b* is seated further back, with the second molar. Ganglion *a* is also connected with the incisors, canines and premolars of the upper jaw and ganglion *b* with the premolars and second molars of the upper jaw. Ganglion *b* however drains in part the first and third lower molars, while the wisdom teeth also drain into the submaxillary nodes. It is, therefore, obvious that the submental nodes may be infected from most of the teeth, at least in theory. The author gives several photographs of submental infections accompanied by radiograms showing the teeth from which the infec-

tion proceeded. Among the affections of the teeth that may cause these infectious adenites are simple periodontitis, chronic neoplastic periodontitis, periapical abscess, suppurative dento-alveolar arthritis, pericoronaritis, ulcerative stomatitis, etc. The text of the article, however, is devoted very largely to other subjects, chiefly the possibility of tuberculous infection through pulp cavities as a cause of tuberculous adenitis and also to adenitis which may complicate scarlatine and the relation of this type to the banal forms of adenitis; since in each case the *streptococcus pyogenes* plays the chief role.

Free Skin Grafting in the Mouth. Eby, Journal of the National Dental Association, July, 1920, vii, No. 7.

The literature of free skin grafting is very large, but not until the requirements during the great war for maxillo-facial surgery did the subject become fully practicable. One of the most valuable contributions is the inlay of epithelium for the prevention of recurrence, shrinkage, etc., and to restore the full depth of the buccal and labial sulci. The advantages gained by this operation are liberation of tissues to make possible plastic operations, restoration of function to the muscles of expression, improvement of facial expression, prosthetic replacement of lost tissues, opportunity for the insertion of dentures, closure of perforations, liberation of lingual adhesions, lengthening of the lips, relief of trismus. Under intervention there are the preliminary steps, the operation proper and the postoperative treatment. There should be an interval of several months after healing and the parts should be free from all infection. The grafted skin must be clamped securely against the raw surfaces to be covered. Temporary prosthesis is used and the author recommends a head cap for the upper jaw and a chin cap and Jackson spring clasp for the lower jaw, but the entire details of preliminary and other procedures are much too long for summing up. In operating intrapharyngeal general anesthesia is usually necessary. The graft should be taken from the upper arm or thigh and should be of the typical Thiersch type. The work should be done with all speed and with an assistant and, naturally, the strictest asepsis. The grafts are to be supported by moulds and these are held in place by the devices already mentioned. These are not to be removed until the fifth day and after spraying, and the use of iodine, they are to be at once replaced until the insertion of permanent dentures.

Dental Surgery and Organic Heart Disease. P. J. Calvy. Journal American Medical Association, 1920, lxxiv, No. 18, p. 1221.

The author calls attention to the serious risk attending radical dentistry by extraction, in the presence of organic disease of the heart. A reaction may follow the removal of the infectious focus, and in consequence an existing chronic trouble may undergo exacerbation, or an acute attack may originate. In the case of a woman 42 years of age, with precordial pain and irregular heart action, extraction of the third lower left molar and several bicuspidis on account of abscess, resulted in aggravation of the heart trouble, in the form of a systolic mitral murmur, slight dilatation and an intermittent action. The

operation left the patient very weak, and she was obliged to remain in bed for two weeks, under treatment directed to the condition of her heart. In the case of another woman, aged 64 years, the extraction of two lower second bicuspid led indirectly to death from dilatation of the heart, at the end of the third day. This patient was known to have hypertrophy of the heart, the systolic blood pressure being 140 and the diastolic 110. The mitral murmur which was present became more audible after the extraction, and the systolic blood pressure began to fall, while the pulse rate and general weakness progressively increased. In commenting upon these observations, the author points out that other and as typical cases, called from private practice and from the records of St. Agnes' Hospital, show severe cardiac reactions to have occurred after the extraction of infected teeth. Caution is especially indicated in older persons in whom the myocardium is degenerated, accompanied by valvular diseases, when the energy index is low and cardial decompensation is imminent.

A Case of Mikulicz's Disease. S. G. Askey. *The Lancet*, London, 1920, ii, p. 502.

This condition is described as a swelling of the lacrimal, and usually also of the salivary glands, in consequence of an infiltration of and replacement of the normal gland structure by lymphoid tissue. The patient observed by the author was a man twenty-eight years of age, who came under his care in India, with chronic amebic dysentery. The parotid glands were greatly enlarged, of uniformly tough consistency, and not tender. The lacrimal glands were about twice their normal size. There was also some enlargement of the submaxillary and sublingual glands. Although slowly progressive, the glandular enlargement is in no sense malignant, and the author has seen one case of fifteen years' duration. The patient referred to above had noticed his face gradually increasing in width, for about three years. The etiology of the disease is unknown, and this peculiar symmetrical involvement of the lacrimal and salivary glands has been variously ascribed to a general infection, a local infection, or a primary neoplasmosis. Treatment, including x-rays, is unsatisfactory.

Side-effect of X-rays. K. Jalowicz. *Zahntechnische Rundschau*, 1920, xxix, No. 34, p. 395.

Although it is a well-known fact that the x-rays may give rise to undesirable associated phenomena, the occurrence of regular gingivitis following radiation of the face has not yet been described, to the author's knowledge. As a sequel of x-ray treatment for the purpose of removing a hairy growth from the face, a painful edematous swelling of both sides of the face made its appearance soon after the radiation. The submaxillary glands were likewise bilaterally enlarged, and swallowing disturbances developed which considerably interfered with the patient's general condition. These symptoms progressed until the climax was reached on the sixth day, when they gradually diminished, and on the tenth day a painful gingivitis became established. The gums were reddened, swollen, and softened; the papillæ were changed and prominent. By means of the customary medical agents for inflammatory processes in the mouth, a cure

could be accomplished after four days, so that on the fifteenth day after the radiation, all the troublesome associated phenomena had disappeared together with the hypertrichosis of the face.

Remote Results in Three Cases of Bone-Graft of the Lower Jaw. Juliard. Schweizerische Medical Wochenschrift, 1920, No. 25, p. 492.

The author reports three observations on bone-grafts dating back eighteen months or longer. These operations were performed in Germany, on French prisoners, by experienced surgeons and even by specialists, under the best clinical conditions, but the results serve to show that this method, which by many is considered as the best at our disposal, still leaves much to be desired. Reexamination of three soldiers, 23, 21, and 32 years of age, respectively, at the end of one year and a half to two years, showed that bone grafts of the lower jaw at any rate, do not always permit sufficient guarantees of solidity. Bony apposition is absent; there is no augmentation of the transplanted tissue. The old bone should have disappeared and been replaced by new bone, but at the end of eighteen months and two years, this process had not been terminated in grafts a few centimeters in length. No matter if the graft be supported by an apparatus or exposed to regional stimulation through strain, rarefaction sets in and mobilization takes place at one of its extremities. However, these observations are not yet sufficiently numerous to permit general conclusions unfavorable to bone grafts, and other results, in other regions of the body, must still be waited for. An improvement on bone-grafting may perhaps be found in osteo-periosteal grafts, which yield excellent immediate results, but the remote and permanent results of which still remain to be established. The application of this method is easy, the affected region promptly consolidates, and a resistant mass is formed; the callus is soft at first, but then becomes hard and demonstrable by radiography. The osteo-periosteal graft method has been repeatedly adopted by the author in his recent practice, so far with highly favorable results.

Adenoma of the Velum of the Palate. Portmann. Bulletins de La Societe Anatomique de Paris, 1920, No. 2.

Glandular tumors of the palatine velum are among the rarest benign growths met with in this region. The author was recently enabled to observe an illustrative case in a woman 45 years of age, who had noticed the presence of a small tumor on the right side of the palate, for about five months past. This tumor had progressively enlarged, up to the size of an apricot pit, but without producing important functional disturbances. The growth protruded into the mouth and pharynx, its indistinct borders vanishing in the healthy adjacent tissues. The mucosa was raised, but smooth and fairly even on its surface, without a change in color. There was no glandular enlargement. The tumor was removed under local anesthesia, and proved to be very adherent to the deeper layers. Immediate suture was applied, and normal cicatrization followed. On microscopic examination, the tumor was found to consist of hyperplastic epithelial glandular tissue; it represented a series of acinous glands much richer in secretory culdesacs than seen in the normal structure of the glandular apparatus of the palatine velum. The acini were generally larger than in the normal condition.

The connective tissue strands were arranged in a very loose-meshed network, and not extensively developed. Numerous small cells could be seen around the vessels and massed in foci. The tumor accordingly answered the description of a typical adenoma of the velum of the palate. Clinical examination permits no distinct differentiation between adenoma, adenosarcoma, or even sarcoma, although one or the other of these affections may be suggested by the configuration, consistence, or the condition of the mucosa. Histologic examination alone removes all doubts and usually shows the presence of a mixed tumor. A pure adenoma of the palatine velum is of exceptional occurrence, and for this reason the above case is worthy of report.

Pathology and Treatment of Diseases of the Peridental Membrane. Black. Dental Cosmos, July, 1920, lxii, No. 7.

For the past fifty years dentists have been on the wrong track because of ignorance of histopathology. Deposits of salivary calculus are not responsible for pus pockets and only serumal calculus below the free margin is to be thought of in this connection. Deposits of serumal calculus on the cementum are the result and not the cause of pus pockets. In addition to the cause just given frequent and continued irritations are responsible for much inflammation of the gums. When the peridental membrane is detached from the cementum such detachment is permanent. The treatment of today of removing deposit and applying medicaments is inefficacious in the management of established pockets. Simply surgical removal of the tissue forming the pocket is a more rational and efficacious method. In the future we must work chiefly along preventive lines. Successive removal of salivary calculus leads to a vicious circle in which more extensive deposit always follows until finally removal is followed by loosening of the tooth. Proper use of the toothbrush will prevent these deposits. Areas of affected gum require as much care as cavities in the teeth. Since 1912 the author has examined hundreds of specimens of gingival tissue, such as the walls of pus pockets and he believes that the true nature of these pockets can now be appreciated. It is not necessary for the gingival tissue to be diseased to sacrifice it, for the peridental membrane having been destroyed, the pocket cannot heal until this wall is eliminated.

Home Prophylaxis for the Prevention of Pyorrhea and Decay. J. L. Kelly. Long Island Medical Journal, 1920, xiv, No. 6, p. 288.

The author emphasizes that the cleaning of the mouth and the polishing of the teeth has been found to be the only effective treatment of pyorrhea and decay, or their prevention. In his opinion, dental hygienists (who at present are allowed to practice only in the office of a dentist) should be free to do their work, like manicurists and hairdressers. The energy of dentists is still bent upon reparative and constructive work, and the present habit of two or three polishings a year by the dentists is injurious rather than beneficial. Two or three yearly polishings lacerate and irritate the mucous membrane, which on the contrary should be stimulated by daily massage and weekly polishing. Patients should be taught to care for their own teeth. Massage of the gums

with an instrument that will not lacerate or puncture them, as does the tooth brush, is absolutely essential to their health, while nothing but friction with a smooth, hard substance, as for instance a flat wooden stick sloped like a miniature shovel will keep the tooth surface free from deposits. The toothbrush does neither of these. The author has successfully taught hundreds of his patients to clean and polish their own teeth, first instructing them to throw away their toothbrushes and to use sterile gauze wrapped around the finger for massaging the gums, as well as small orange wood sticks for polishing the teeth. He finally developed an instrument for massaging the gums and a polisher for polishing the teeth. The instrument for massaging the gums holds two sterilized rolls of cotton, and has a loop end for scraping the tongue; it is called the "Kuroris" (cura oris, care of the mouth). After the patient has learned how to clean his mouth with the Kuroris, he is taught how to polish his teeth. The polishing is done with a simple instrument, consisting of a handle carrying a wooden stick at either end. These wooden sticks are dipped into an antiseptic solution, and then into a polishing powder. Each tooth is polished separately, principally where the deposit of foreign matter has been rendered visible by means of the application of a disclosing stain which reveals the plaques. If the public would learn the true value of the care and cleanliness of the mouth and teeth, much of the suffering now experienced would be eliminated.

There are three reasons why the toothbrush should not be used, any one of which is sufficient reason for discarding it. (1) The brush does not clean the mouth, neither does it polish the teeth. (2) It cannot be sterilized unless it is boiled at least twenty minutes. (3) The brush cuts the teeth and gums if persistently used. The author's experience has led him to the conviction that the toothbrush is a distinct menace to health, perhaps even to life itself. It is the actual cause of thousands of cases of oral infection, the inoculator of multitudes of pyorrheal conditions. He is bitterly opposed to the toothbrush, which he describes as archaic, obsolete, and a relic of the dark ages.

The Causative Relation Between Febrile Conditions and Eruption of Teeth.

H. Abels. Wiener Klinische Wochenschrift, 1920, xxxiii, No. 44, p. 959.

Upon the basis of a series of observations from the ambulant material of the Caroline Children's Hospital in Vienna, the author protests against the still popular assumption according to which all sorts of acute diseases can be produced through the eruption of teeth out of the alveolus and the gums. Various factors are held responsible as intermediate links, such as forcible separation of the alveolar margins, traction on the gums and the regional nerves, gingival irritation with subsequent inflammation and sialorrhea, leading in their turn to diarrhea or other disturbances. Although the explanation of the injurious process varies greatly, the actual existence of a connection between the eruption of teeth and children's diseases is asserted as a fact, not only by the laity, but also in a somewhat modified form, by members of the medical profession. The so-called "anti-dentitionists" claim on the other hand that this belief in the pathogenic effect of teething is rather due to imperfect knowledge of the actual disease, and that dentition is an absolutely

physiologic process, incapable of giving rise to pathologic phenomena. But it is undoubtedly true that the eruption of teeth is often associated with cough, fever, diarrhea, or other acute disturbances, and evidently hastened also in the presence of febrile states. In all probability, in analogy with the effect of infectious diseases on growing bone, the matrix of unerupted teeth is stimulated by the microorganisms in the circulating blood and their toxins. Serial observations on nineteen cases of measles, in children under two years of age, showed an extraordinary increase of erupted teeth during the time of the febrile attack and immediately afterwards. The accelerating effect of severe and prolonged fever strikingly manifested itself in the eruption of teeth which were due in an approximate period of ten weeks, for the most part in the first four weeks. Infections of the influenza-group are undoubtedly capable of causing the same chronologic mode of distribution of dental eruptions as the author was enabled to demonstrate in measles and their sequelæ. Children with a tendency to "catch cold," who are attacked by such infections about every two to three months, will presumably get the larger portion of their teeth precisely during or immediately after a time of coughing and sneezing. The author's clinical material plainly showed a temporary and causative connection between febrile conditions and teething; but this coincidence of new teeth with acute infections must not be interpreted in such a way that the teeth are the causative agents of the disease. The inflammatory or at least hyperemic, congested condition of the buccal mucosa, which in children accompanies practically all febrile conditions, especially those of prolonged duration, probably plays an important part in this connection.

The Canalicular System of the Dentin. E. Urbantschitsch. *Wiener Vierteljahrsschrift für Zahnheilkunde*, 1920, No. 1.

The dentin is known to consist of the ground-substance and the dentin-channels or tubules. This tubular formation of the dentin has been described as far back as the seventeenth century. The author investigated the canalicular system of the dentin, basing his histologic studies on sections of teeth which had been stained according to Schmorl's method of bone-staining. The main channels or trunk-tubules show a certain symmetry in regard to their situation and direction. Secondary branches of the dentin-tubules are also encountered, which are interpreted by the author as anastomoses of the dentin-canalliculi with each other. He was furthermore enabled to observe continuations of the dentin-channels beyond the enamel and dentin boundary, as well as club-shaped thickenings of the end of the dentin canaliculi. His observations may be summarized as follows: The dentin possesses an abundant canalicular system, which communicates with the enamel and the cement. In youthful teeth, the ramification of the dentin tubules is equally abundant in the crown as in the root. The teeth of older individuals are not very suitable for the study of the lateral branches of the dentin canaliculi, probably on account of the diminution in the caliber of the channels with advancing age.

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EDITORIALS

Specialties in the Dental Profession

IN THIS issue of the Journal is an article entitled, "The Relation of the General Practitioner to the Specialist in Dentistry." It is taken from *Oral Health*, December, 1920, and is a résumé of an address by Dr. A. W. Thornton, Dean of the Dental Faculty, McGill University, and prepared for publication by Major W. R. Green. We regret that the full address was not published, but presume what we have represents the views of Dr. Thornton as given before the Ottawa Dental Society. This address contains many thoughts that will bear considerable study and review. Some of the reasons given for several of the specialties in dentistry have been more correctly summed up than some men will be willing to admit.

We have often thought, and have several times come in contact with the fact, that men desire to enter into a specialty because they believe it a

better field for making money. Each year we have applicants for postgraduate work in orthodontia who admit they are going into orthodontia because they believe it offers a better field for financial opportunities than does general practice. It is needless to say that such students are discouraged, because we do not believe they have the proper view to become a credit to the profession, and we do not want them as students.

The financial opportunities have been the principal reason so many x-ray laboratories have come into existence. The majority of those laboratories are conducted by men who have no dental training. They have no idea of improving the standards of dentistry as they have only been technicians or x-ray salesmen, and are attracted to radiography purely from a monetary standpoint. We do not condemn a man because he is anxious to advance in the commercial world, but we do not think it is good for a profession to have men in it who have no ideals except those that can be measured by dollars.

Dr. Thornton also calls attention to the fact that in his opinion there are but two subjects that can be made specialties of dentistry; viz., orthodontia and oral surgery. With this view we are in accord. We also believe that these subjects require a particular line of technical training that is different from the requirements in other dental branches. Orthodontia was the first specialty that stood out to such an extent as to attract attention. This was principally due to the fact that Dr. Angle organized a special course of instruction for those who wished to specialize. If it had not been for this advance in the teaching of the subject, orthodontia would have been greatly retarded in taking its place among the specialties. It is true some have devoted their entire time to the practice of orthodontia without any special postgraduate training, but they are in the minority.

With the definite progress which postgraduate teaching of orthodontia has made since 1900, we are compelled to disagree with Dr. Thornton when he states that only those who have had years of experience in general practice should take up the specialty of orthodontia. Experience has proved that the greater number of successful practitioners of orthodontia are found among those who have had but a year or less of general practice. We find some men who have given considerable time to the practice of dentistry before going into orthodontia, but they are in the minority. In fact it has been found quite difficult for the older men to grasp the instruction that is given in postgraduate work; this was so true that at one time Dr. Angle made a ruling not to accept men who had practiced general dentistry more than a few years. The arguments that a man must have a number of years' experience before taking up a specialty might have some weight if it were not for the fact that with the present educational requirements for entrance to a dental school and the four years of dental training, a student has spent sufficient time to obtain a good view of general dentistry. During his years of dental training, he will have seen a variety of conditions in the clinic, which gives him sufficient foundation upon which to build his specialty.

It seems to be a waste of time for any student of dentistry or medicine

to spend a number of years in the practice of something he does not expect to follow. With the present system of dental education, a student cannot afford to spend any more time than is necessary before he specializes. After he has finished his college course and has decided that he is going to specialize, he should immediately begin the study of that subject in the most approved way, so that he will be prepared to render some return to society before he is an old man. It is a waste of time and energy to compel a man to practice a number of years before allowing him to take up a specialty.

The oral surgeons of the future will no doubt be men who have had both medical and dental training if they are to give the specialty the standing it should have. Up to the present time postgraduate teaching in oral surgery has not made the advances that it has in orthodontia. This may be because methods have not been standardized, the literature is not in good shape and societies of oral surgeons have not been organized. Such courses in oral surgery as have been offered have not been satisfactory. With the knowledge gained by a few men who did actual oral surgery during the war, it should be possible to so standardize different methods that oral surgery may be more successfully taught than it has been in the past. We look for much progress in this specialty during the next few years.

There may be too much of a tendency for specialties to spring up among the dental and medical professions, but regardless of that evil, we believe the public is receiving better service because of specializing, and if that is true, a good purpose has been accomplished.

Are the Specialists in Orthodontia Derelict in Their Duty Toward the Dental Profession?

THE year 1921 appears upon the shifting scenes of time at a period when never before in its history, has the practice of dentistry been more attractive and interesting nor has it ever made history and advancement with such rapid strides, as at this time.

The dental profession is fairly clamoring for information and advancement in all of the various departments of dentistry, eager to learn, ambitious to be "up to the minute" and the field is being more and more divided into specialties. Orthodontia, at one time standing alone as a specialty in dentistry, does not now enjoy this distinction; on the other hand it has become only one of the many departments which may be specialized, or may be practiced in conjunction with general work.

The above is all evidenced by the enrollments in the study clubs of our large cities, many of them having a long waiting list, men fairly standing in line, as it were, to procure modern instruction in conductive anesthesia, removable crown and bridge, prosthesis, as well as many other subjects which seem to be popular at this time.

Now to the point. How many waiting lines have we seen clamoring for instruction in orthodontia? How many postgraduate courses or study clubs ever offer instruction in orthodontia at this time?

You say there is not the demand for this instruction; but why, then, is there not sufficient demand? Is it because the dental profession is being taught what little orthodontia it feels it requires for the most part in general practice, by spectacular advertising, propaganda calling attention to some particular type of appliance and the almost incredible and none-the-less impossible things which it will do all by itself if once set in motion?

Appliances are being advertised and claims made for them which are no less ludicrous to the trained man in orthodontia, than is the traditional cotton root canal filling, to the trained root canal man of today.

One appliance manufacturer, in exploiting the dental profession upon this subject, has addressed personal letters to members of state dental organizations, immediately subsequent to the state meeting, advising them with deep regret, that other duties prevented him from being able to attend the recent meeting and appear on the program to demonstrate his appliance before the organization, and so on and so forth.

Of course, all of this is amusing, to say the least; but, at the same time, this kind of propaganda is possible only because there is less actual information possessed by the general practitioner on the subject and methods of modern orthodontia than on any other branch of dentistry, hence misinformation is accepted by some as a substitute.

There is still another angle to the situation. The dentist many times starts a case of malocclusion because of his location. He may have no one to whom to refer his case. Lacking a thorough knowledge of orthodontia, he is looking for a short cut. He prefers to compromise and he excuses himself under the very popular delusion that the public is not willing to compensate him properly for highly specialized work. In this assumption, the dentist is entirely and grossly wrong, for as a matter of fact there is no better or more highly paid department of dentistry than the treatment of malocclusion. The compensation feature will not "hold water." If the dentist fails to be properly compensated for this work, it is either because he is unable to prove his case, or because he is not in a position to deliver results in orthodontia. Any individual who can afford an automobile all the way from a Ford to a Pierce Arrow can well afford and will arrange to have his children's mouths properly treated if the dentist is able to obtain results. Again, there is no more delightful or interesting work in the practice of dentistry, than that of orthodontia when practiced by modern methods.

There are many men who can promptly give the last word in conductive anesthesia, prosthesis, root canal technic, exodontia, or in fact any of the various specialties of dentistry, who will frankly admit that they know nothing about orthodontia, and rather pride themselves in knowing so little of the subject.

The fundamental principles of orthodontia and modern mechanical technic are badly needed by practically all men who have not been fortunate enough to secure special training. In turn, the public is badly in need of more orthodontists or at least more men who really understand the subject sufficiently to do good work for their patients.

Again, we ask are the specialists derelict in their full duty to the dental profession in not making determined efforts to advance this specialty among the general practitioners and to dispense information to those who seek the truth, that being the real object of true science? There is a great tendency among odontologists to take the view that it is useless to give papers or clinics before dental societies and this is proved by the fact that some specialists have stated that they would not give an orthodontic paper before a dental society. This is an attitude that will not do the dental profession any good and allows misinformation to take the place of proper instruction. Papers should be given before the dental societies, which will enlighten the dentist as to the possibilities of modern orthodontia and teach him enough of the mechanical principles so that he will not be the prey of every misleading appliance advertisement that may come before him. Clinics should be given featuring what can be done in given cases and the design of modern appliances demonstrated. By giving such instruction the specialists will be doing a good work for the dental profession and the public, as well as supplying a new impetus to the advancement of orthodontia as a science.

—H. C. P.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Alumni Society of the Dewey School of Orthodontia

The next annual meeting of this Society will be held on April 25th and 26th at the Hotel Ambassador in Atlantic City. The usual high standard of the meetings of this society will be maintained. Clinics and evening sessions will be included in the program. All interested in Orthodontia are cordially invited to attend these meetings.

GEORGE F. BURKE, Sec'y.

741-43 David Whitney Bldg., Detroit, Mich.

The British Society for the Study of Orthodontics

An ordinary meeting of the Society was held at 11, Chandos Street, Cavendish Square, W., on Monday, October 18th, 1920, Mr. G. C. Campion, President, in the chair.

The minutes of the last meeting were read and confirmed.

Several new members were welcomed by the President, and formally admitted to membership.

Mr. A. Garrow, L.D.S., Edin., of 29, Queen Anne Street, W.1., was ballotted for and elected.

Mr. W. Warwick James explained the construction of an improved anti-mouth-breathing valve.

Notes of Interest

Dr. Albert H. Ketcham introduces his associates in the exclusive practice of orthodontia, Dr. William R. Humphrey, Dr. Hays N. Nance, and Dr. Albert E. Voss, 725 Mack Building, Denver, Colorado.

Dr. C. H. Juvet has removed his office to Suite 512, Jackson Building, Ottawa, Canada. Practice limited to orthodontia.

Dr. Harry A. Holder is opening his offices, 504-506 Jackson Building, Nashville, Tennessee, for the practice of orthodontia exclusively.

Dr. Harry G. Jones has opened offices at 320 Pennway Building, Indianapolis, Ind., and will practice orthodontia exclusively.

After March first, Dr. R. W. Noland will limit his practice to orthodontia. Office removed to 626 Fleming Building, Des Moines, Iowa.

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No. 4

ORIGINAL ARTICLES

THE PRINCIPLES OF THE JACKSON REMOVABLE APPLIANCE*

BY VICTOR HUGO JACKSON, M.A., M.D., D.D.S., NEW YORK CITY

IN PRESENTING this paper, it is the purpose of the author to describe the more improved methods of practice in his treatment of "Orthodontia and Orthopedia of the face", considering as far as time will permit, the general principles and advantages of the removable regulating appliances devised by him.

The first object in developing a new method of anchorage to the teeth was to perfect one which would permit the appliance to be movable and, at the same time, be securely retained.

A movable appliance is one that can be readily removed by the patient and by the operator for cleansing the teeth and the apparatus.

We are all familiar with fixed regulating appliances. They are anchored to the teeth in such a manner that they cannot readily be removed by the patient for cleansing or by the operator for adjustment.

Recently, the whole profession and many patients have begun to realize the great necessity of the careful cleansing of the teeth being carried out systematically by the treatment known as "Prophylaxis" and are becoming aware that, for that reason, regulating appliances and bridges of artificial teeth should be movable.

Realizing this necessity, the writer has spent most of his professional life in devising and developing such appliances as would help to prevent decay and save the teeth.

A few operators have been opposed to movable appliances. The opposition was due principally to the careless habit of an occasional patient in leaving his regulating appliances out at times, which naturally would interfere with the progress of the regulating. However, by the use of a *record card* that the

*Read before the meeting of the American Society of Orthodontists, Chicago, April 5, 1920.

operator has at command, this practice would be readily detected and the condition corrected.

When the operator has discovered that a movable apparatus is not kept in place by the patient at all times, including time of mastication, as directed, he should immediately ligate the appliance to the anchorage teeth with wire, making it a *fixed appliance*, which generally can be done in a few minutes, and then direct the patient to return in four days for further adjustment of the appliance and for cleansing. At the same time, he should notify the parents that the ligating is necessary, as the conditions require that the force of the appliance should be continuous. In wearing the appliance ligated, the patient soon learns that it is not so pleasant to use a fixed appliance and make extra visits, as to wear a movable one, keep the teeth and appliance in a cleansed condition and make fewer visits. When necessary and well managed, this plan works well.

When rubber "equalizing bands" are used with a *fixed appliance*, the child is quite as apt to deceive the operator by leaving off the equalizing bands, which might prove as harmful as the leaving out of a movable appliance.

The movable regulating appliances to be described are made of spring-wire. They are so anchored to the teeth that they can be easily removed by the patient for the cleansing of the teeth and appliance.

For this purpose, the patient is directed to remove the appliance after each meal and before retiring. It can be quickly removed by the operator for making any necessary changes in its adjustment. The movable appliance is made on a model of the teeth in the laboratory.

When the model is accurate, the appliance should fit the natural teeth of the arch so well that there would not be any dressing or change required in its adjustment.

APPLIANCES TO DESIGN

Before designing a regulating apparatus, accurate models of the maxillary and mandibular arches of the teeth are made and thoroughly examined to determine how parts of an appliance can best be arranged to correct the irregularity.

All regulating appliances are designed from the study and measurement of the models and obtainable data regarding the regulating case. Pencil designs of the apparatus are made in a "*duplicating*" or a "*triplicating*" book; one copy of the design remains in the book permanently; another, with the models, aids the laboratory assistant in understanding the form of appliance to be made; and the third copy is utilized in cases of consultation, being forwarded to the consultant to assist in describing the plan of procedure and treatment.

METALS FOR APPLIANCES

Precious metals for making appliances have always been recommended by the author, but it requires much more time in making and repairing them, than when suitable base metals are used. He soon learned that some base metals have more spring properties and are found to be more efficient, as they

are more resilient and persistent than others. The use of *silver nickel*, or *German silver*, springs has generally been found satisfactory. Its appearance is desirable as it is near the color of platinum which is much less conspicuous than gold. This would prompt its continued use. Polished gold can be seen at a considerable distance from the patient, which, with some would be objectionable.

Another important reason for recommending base metals is that springs can be more quickly united with chemically pure tin as a solder than with gold, and can be unsoldered for changing the relationship of the pieces in a few minutes without drawing their temper or otherwise injuring them. This does not follow when gold solders are used.

PHOSPHOBRONZE

Phosphobronze of good quality is a satisfactory spring metal. It is similar to gold in color but is useful for making springs and spurs for orthodontic appliances. In use it holds its color well and is more springy than the metals described. When well drawn, it is tough and suited for much longer service than any of the metals mentioned. This is owing to its resilience and persistence. In time, all metals lose their springiness and come to what is known as a "stand". The metals above mentioned, usually come to a stand much sooner than the phosphobronze. It is claimed that now there is no lead in its composition. Chemically pure tin, as a solder, has more affinity for phosphobronze than for most other metals, thereby making a stronger union. In use there is no special chemical action apparent or waste around the springs.

GOLD PARTIAL CLASP METAL

After much experimentation the writer succeeded in forming a partial clasp metal made of 18 karat gold rolled plate, $\frac{1}{4}$ on German silver, 36 U. S. standard wire gauge. In making an appliance, the gold side rests against the tooth, while the solder, chemically pure tin, is applied on the German silver side, because it has more affinity for the German silver than for the gold. The 18 k. gold as purchased in the market was at one time recommended by the writer for partial clasps but it was found that, after being in use for a time, it would peel from the solder.

LIGHT COLORED BRONZE

Partial clasps made of *light colored* bronze spring plate, No. 36 gauge, have been used in certain cases for several years with thorough satisfaction. When used for partial clasps and other parts of an appliance, as resting on the gum, etc., the metal keeps bright like gold and does not encourage fermentation, or stain the teeth. In practice, however, the writer is continuing to use the gold partial clasp metal.

APPLIANCES TO MAKE

The author will describe as in previous writings, his general plan of making regulating appliances, first speaking of the principal parts of an appliance and their purposes and also his method of uniting them with solder.

The general parts of an appliance are *partial clasps*, *spring clasps* or *wire clasps*, *base wire*, *spurs* and *springs*. These are usually united with chemically pure tin as a solder.

In making a regulating appliance, an accurate model is necessary. Any molar or premolar teeth that are not fully erupted but are to assist in the anchorage should first have a groove cut in the plaster of the model beside the tooth toward the neck for the adjustment of a partial clasp to project under the gum to strengthen the anchorage. This is usually done with a rather straight

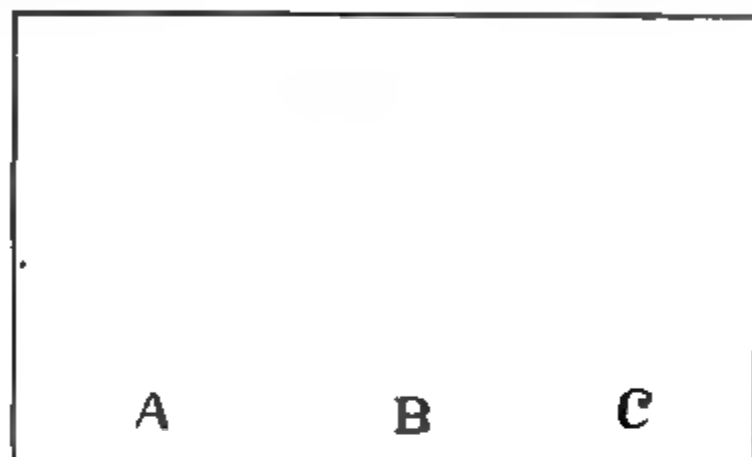


Fig. 1.

D**E**

Fig. 2.

Fig. 3.

hoe excavator. The operator must be sure to preserve the natural shape of the tooth and not remove or injure the plaster representing the gum on the lingual side of the groove as, in soldering, the solder is liable to run into this injured part, which would cause the appliance when inserted to rest on the gum, while the thin partial clasp would pass between the tooth and gum without causing irritation.

PARTIAL CLASP FOR ANCHORAGE—FIG. 1—A

A partial clasp is made of plate metal No. 36 U. S. standard wire gauge, being of sufficient size to fit the lingual surface of a tooth used for anchorage. It is contoured with a *contouring plier* having the end of one beak cup shaped

and the other formed to fit it. (Fig. 2.) The partial clasp is always overcontoured to cause it to rest on the tooth at the neck and near the grinding surface. (Fig. 1—A, B, C.) A partial clasp is arranged to fit the lingual side of each anchorage tooth, as to two canines or premolars and two molars in each arch. When connected by a base-wire in this manner, the anchorage is quite complete, but with the improved anchorage, it is generally found advisable to have also partial clasps arranged on all of the teeth in the lateral maxillary divisions of the arch, that is—the molars, premolars and canines.

CLASPS FOR ANCHORAGE

There have been various forms of clasps devised by the author for anchoring regulating appliances, many of which have previously been described. Following are some of the ordinary examples:

Fig. 4

SPRING CLASP—FIG. 3—D, E.

A spring clasp is usually made of spring wire No. 20, 21 or 19 U. S. standard wire gauge shaped with a *clasp-bender* (Fig. 4) or a round-nosed pliers to fit the buccal surface of an anchorage tooth near the gum with both ends formed to pass over the arch at the junction of the two adjoining teeth to rest on a *partial clasp* and be attached with solder. It is then known as a *spring clasp* attachment. (Fig. 3-E.)

WIRE CLASP FOR ANCHORAGE

A round wire clasp is used in any part of the arch. For clasping a molar it is generally arranged to extend from the appliance around the last molar of the arch to rest on the buccal surface near the gum, or it is arranged to pass from the appliance over the arch at the junction of two teeth to rest on the buccal surface of a tooth as a molar, premolar, or canine. The *wire clasp* is usually preferred when the conditions are favorable as, when the teeth are well erupted, etc., it can be used without collars but, when the teeth are not well erupted, collars with lugs cemented to the teeth should be employed.

FLAT CLASP FOR ANCHORAGE

A flat clasp made from plate metal has its advantages. It can be shaped to pass between the teeth when desired, at any favorable location for anchorage and, at the same time, extend from the apparatus to rest on the buccal side of a canine premolar or molar, as described.

LOCKING DEVICE

A locking device of an appliance will be mentioned here and more fully referred to later. It has a collar with a buccal lug resting near the gum, cemented to a canine or a premolar and to a molar on each side of the arch. A wire clasp is formed to extend from the appliance over the arch in front (or back) of the canine to engage with the buccal lug, on each of the collars on the canines and the molars, with the ends of each of the clasps terminating in a hook. This form of anchorage is suited for supporting an apparatus for any class of irregularity of the teeth.

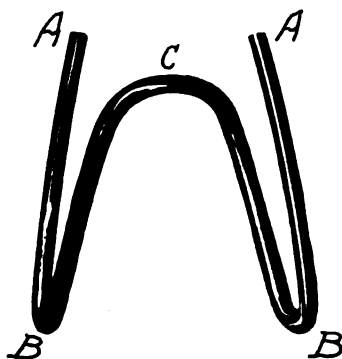


Fig. 5.

BASE WIRE

A Base wire is the foundation of a regulating appliance. It is a large spring-wire of good temper, usually made of *German silver*, *silver nickel*, or *phosphobronze*. It can be made of any suitable spring metal. The base wire may be a *rigid* or a *spring base wire*. There are four general forms of base wire—*lingual*, *palatal*, *palatal with loop*, and *labio-buccal*. The body and arms of a base wire should be sufficiently strong and rigid, so that they will not be sprung from their normal position, when necessary force is exerted by strong springs which are attached and extended from them for any purpose in moving the teeth.

The different sizes of base wire generally recommended are:

For children between the ages of 3 to 6 years.....No. 13 gauge.

For children between the ages of 6 to 8 years.....No. 12 gauge.

For persons between the ages of 8 to 15 years.....No. 11 gauge.

For persons between the ages of 15 to 21 years.....No. 10 gauge.

For more mature adults, a more rigid base wire.....No. 9 gauge.

LINGUAL BASE WIRE

Fig. 5 shows a lingual base wire for expanding laterally the *mandibular arch*. It forms the framework of a regulating appliance to which springs are attached for any purpose. It is made the same general shape as the *base wire with loop* for expanding laterally the maxillary arch to be described later.

It is formed to follow the lingual curve of the arch just below the margin of the gum back of the incisors and extends backward and downward to the last molars where the ends are bent in a medium-sized curve to extend forward, thus forming arms to rest on partial clasps arranged on the lingual side of the anchorage teeth, to which they are soldered with the wire-clasps or spring clasps, spurs and finger springs.

The action of the appliance is caused by adjusting the springs according to the part of the arch requiring movement. For expanding laterally the *anterior* part of the arch, the ends of the arms of the base wire, "AA," are pressed outward by the hands, or by an *expanding plier*, thus bending the base wire "BB". For expanding laterally the *distal* part of the arch, the parts of the appliance at "BB" are pressed outward bending the base wire at "C".

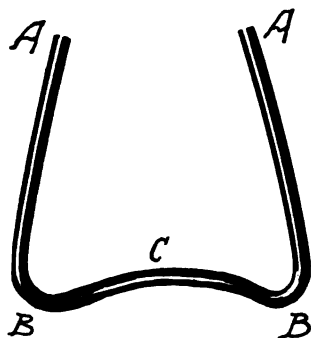


Fig. 6.

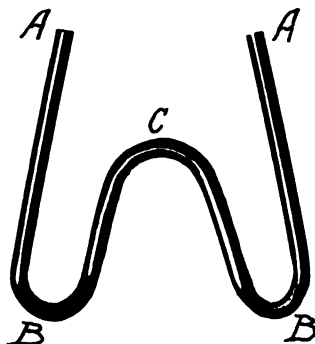


Fig. 7.

PALATAL BASE WIRE—FIG. 6

In the study of the form of the dental arch, it is often predetermined that the distal part of the arch is broad enough.

In practice, it is found that in cases requiring lateral expansion of the dental arch, a less number need expansion of the distal part of the arch, either maxillary or mandibular.

In making a regulating appliance, when only the *anterior part* of the maxillary arch requires lateral expansion, a base wire known as a palatal base wire is arranged to cross the distal part of the arch where it is broad enough, usually opposite the last molars.

The palatal base wire is always shaped to follow the palatine vault of the dental arch, with the ends bent forward to extend to the canines. Arms are thus formed which rest on partial clasps, usually arranged on the lingual side of each of the molars, premolars and canines.

The arms are the foundation and anchorage portions of the appliance. The ends of the metal arms are tapered by filing to make them less bulky. They are

soldered to the partial clasps with the ends of the spring-clasps and finger springs; arranged in this manner the ends of the arms are bent outward from time to time to expand the arch in the region of the canines and premolars, force being caused by pressing outward on the ends of the arms "AA" which bends the base wire at "BB".

The apparatus with the palatal base wire following the palatine vault of the arch, as described, is not intended to expand the distal part of the maxillary arch as the palatine curve of the base wire "C" should never be straightened or changed for that purpose. It would have more tendency to tip the teeth in their sockets than when a palatal base wire with loop is employed.

PALATAL BASE WIRE WITH LOOP—FIG. 7

When the maxillary arch needs general lateral expansion, a palatal base wire with a U-shaped loop is employed. The apex of the loop should always rest deep in the palatine vault, with the sides of the loop extending backward, following the deeper lines of the vault and forming a rather broad outward curve toward the molars on each side; the curve should rest distally a little beyond the line of the last molars, with the ends extending forward forming arms and resting on the lingual partial clasps on the molars, premolars, and canines.

This base wire is similar in form to a lingual base wire, and its action is about the same.

For expanding the anterior part of the arch the ends of the arms "AA" are pressed outward, bending the base wire in the distal part of the arch at "BB".

When the distal part of the arch needs expansion, outward pressure is exerted on the sides of the distal part of the appliance at "BB" which bends the loop of the base wire at "C" increasing the width of the loop. These changes should always be governed by the added measurement as indicated on a *record card*.

An appliance with this form of base wire is adapted for the lateral expansion (or contraction) of either the anterior or the posterior part of the arch as needed, and the expansion can be carried to any desired limit, either with the maxillary or the mandibular arch. This, the writer thinks has not been accomplished as accurately with any other single device.

LABIO-BUCCAL BASE WIRE

A labio-buccal base wire has been used many years in expanding the arch and moving individual teeth. It is a curved bar located on the labial and buccal sides of the dental arch sustained by entering tubes, eyelets or hooks on collars cemented to the teeth, or by spring clasp attachments. The labio-buccal base wire is used for moving the teeth as by ligatures, extending from the bar around the teeth, by attached springs, etc. For retaining the teeth it may be sustained by spring clasp attachments or by spurs projecting from the base wire to enter tubes, eyelets, or hooks on collars or by spurs projecting from collars cemented to the teeth. (Fig. 8.) Its size varies according to the force desired. Many years the author used labio-buccal base wires of various forms, as a plain base-

wire, or a base wire with corrugations, U-shaped loops, etc. The base wire with loops is often the most serviceable.

The palatal and lingual base wires previously referred to are adapted to the particular purpose needed. It will be noted that they are generally of rather large diameter and purposely made stiff, to serve as a foundation for the regulating appliance and to prevent the teeth from moving back and forth in their sockets, as during mastication, while being regulated, and, while being retained. In this manner tenderness is avoided. Often when the teeth are supported only by a small spring, they are easily disturbed in their sockets and become more or less tender, delaying new bone deposits, and consequently there would be an inclination on the part of the patient to avoid necessary normal mastication. Accordingly, with the former plan, there is less tendency to excessive absorption of the alveolar process and less irritation and general tenderness of



Fig. 8.

Fig. 9.

the teeth than when small springs are used. As noted, the action of the large spring base wire is controllable and the extent of each movement is limited as desired.

SPRINGS

Springs for moving the teeth as referred to, are made of silver-nickel, phosphobronze, or spring-gold. Any suitable spring metal desired can be used. The sizes usually employed are Nos. 18, 19, 20, or 21 U. S. standard wire gauge.

Springs are usually named according to their shape, position or purpose, as finger springs, loop-shaped springs, semicircular springs, etc., several forms of which are shown in this paper.

SPURS

The appliance is arranged so that it will be *supported* by the teeth to prevent it from resting unduly on the gum tissue. For this, a *wire spur* (Fig. 16) is attached to the body of the apparatus and shaped to extend and rest usually on the crown of a molar and a premolar on each side of the arch.

SHELF

Another method of supporting the appliance that is superior in some respects for this purpose is to attach a *shelf* on the lingual side of each collar used for the anchorage-locking-device, the spur or shelf being at-

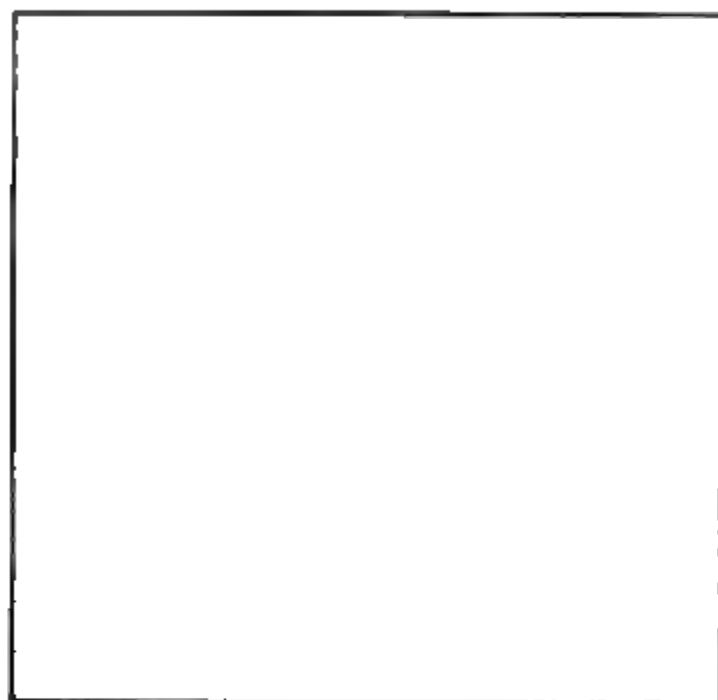


Fig. 10

Fig. 11

tached to the gingival edge of the collar near the gum line. (Figs. 9 and Fig. 16B.)

A similar shelf is also used in case of *close occlusion* of the teeth and for *moving teeth bodily*. The shelf is usually made of plate metal about 28 gauge, arranged to project from the collar about two millimeters, the parts being properly fitted and soldered in the usual manner. The collar is then cemented to the tooth and a *model made* representing the collar and shelf in place.

The appliance is designed and the parts arranged on the model to rest on the

elves with the wire clasps extending to the buccal side to complete the anchorage.

When a regulating appliance has been designed, the different parts are always shaped to the model and then assembled, to be united by solder. (Fig. 10.)

SOLDERING—FIG. 11

In soldering, the base wire, spurs and springs are usually held by moldine in position for the soldering and, when necessary, further sustained by pressing steel pins by the side of them into the model.

SOLDER

Chemically pure tin is usually employed as a solder in uniting the parts of the appliance, the tin being fused by a large soldering iron. Before soldering, the parts are *fluxed* with *chloride* of zinc or with a *no-korode* flux.

Knowing the detrimental systemic effects of lead, the writer early became convinced that in making these appliances it was not wise to use a solder that

Fig. 12.

contained lead, but he wishes to say that he has never known of any case where harm resulted from the use of such a solder.

When lead is excluded from the metals used in an appliance, it has also been found by long experience that there is less chemical action caused in acid mouths and consequently less oxidation or tarnish of the appliance.

The practice of gold plating or gilding a regulating appliance made in this manner is generally objectionable, as gold, chemically deposited on the whole of an appliance is porous and when bathed in saliva, sometimes develops a chemical action, which causes the metal to tarnish more than when no plating is employed. However, when gold plating is to be used, it is usually advisable to first apply a coating of copper and then a good coating of gold.

DIVISIONS OF THE DENTAL ARCH—FIG. 12

In the study of the dental arch for the purpose of orthodontia, as for expanding the arch or bringing about any necessary correction in the position of the teeth or for any other purpose, the writer has found it an advantage to divide the arch into three divisions, sections, or segments; as, The *Right Max-*

illary Division, The Left Maxillary Division, and the Intermaxillary (or Incisive) Division.

These divisions of the maxillary arch are the natural divisions as separated and distinguished by the lines of the premaxillary and intermaxillary sutures. The intermaxillary division contains the four incisor teeth. Each lateral division of the arch includes the canine, premolars and molars. The divisions can be symbolized as follows: R-M-D

L-M-D

I-M-D

To complete this system for study, record, and convenience the mandibular arch is separated into similar divisions.

Accordingly in the examination of orthodontic cases, one should determine in what division of the arch the irregularity is located.

The regulating appliances described are also divided into three divisions, constructed to deal with the irregularity presented in each division of the arch.

Fig. 13.

EXPANSION OF THE ARCH

When the teeth are irregular, they are usually much crowded in the arch. This is most generally evidenced by there being insufficient space between the canines for the proper arrangement of the four incisors.

Many operators are making a mistake in expanding the dental arch to provide room for the incisors by moving outward the premolars and molars without moving outward at the same time the canines, which are included in the lateral maxillary divisions of the arch.

Fig. 13 is prepared to illustrate the lines of movement of the teeth in properly expanding the arch laterally. It shows that the movement of the molars and premolars in a buccal direction, as illustrated by the lines, "C, D, E and F," does not increase the width of the arch anterior to them as required.

Therefore, in expanding the dental arch *laterally*, the appliance should always be arranged to include the canines, if present. With these conditions presented in such a large majority of cases, it has been necessary to devise a *standard* appliance, strong and complete in itself, that is definite, thoroughly efficient and which can be handled. It must have a strong foundation to which

springs are attached, for sustaining the anchorage and for individual tooth movement.

ANALOGY

To impress upon the mind the analogy between removable regulating appliances and the human body, the author will refer to the many necessary mechanical features embodied, their *capability* and their impressive similarity in form and action, an understanding of which he is sure will prove instructive and beneficial.

The base wire is the foundation or body of a regulating appliance. As previously stated, it is made of large spring wire. The portion of the base wire connecting the lateral divisions of an appliance is always rather large and strong; the ends are bent to project forward, (or backward), like arms; they are shaped to rest on the partial clasps, usually on the lingual side of the anchorage teeth.

The base wire or body may be compared to the human body with the arms *extending forward from the shoulders*, as the arms of the base wire extend forward from its body or shoulders. There are fingers on the ends of our arms and, likewise, there are metal fingers arranged to project from the ends of the metal arms of an appliance in the form of springs.

Therefore, in making a regulating appliance, it is essential that it have a strong body, strong arms, and strong fingers, as each is to do a definite work. They should be large and strong enough to move the teeth a definite distance in a given time and not move the teeth further than intended.

If a man be not strong enough to accomplish promptly the work laid out for him, a stronger man is employed.

Following the same idea, one would make a regulating appliance strong, always having it built strong enough to cause the arms and fingers to act definitely in making the desired movement of the teeth and process.

Again, the human body performs all movements by muscular action; in effect, this is similar to the action of the spring parts of the regulating appliance.

The fingers of the human body grasp objects and move them definite distances with ease, following the command of the will.

The plan of this system of regulating is to have an appliance built sufficiently strong and so thoroughly anchored, as to move the teeth in the desired direction, in a limited time.

The analogy mentioned will be apparent in the study of the different appliances presented, thus making some of the details in their description more readily understood.

In *designing* an apparatus for moving the teeth, one would generally be led to adopt *correct forms of metal arms and fingers, etc.*, by first shaping his finger as he would to move a similar object.

ORTHODONTIA AN EXACT SCIENCE

Orthodontia has been recognized as a science, but it is desirable that the different phases of orthodontia be so thoroughly understood as to deduce it

to an *exact science* and that the mechanics be so simplified that any operator of steady judgment can perform at least ordinary operations without overtaxing his mechanical skill.

RECORD CARD

To secure accuracy in applying force for the regulation of the teeth, several years since, the author devised a method of making a *careful pencil-tracing* on a *record card* of each regulating appliance in use before applying force, and indicating on the card a record of the amount of each subsequent change in the

Fig. 14.

appliance for moving the teeth. This would be a *permanent record* of the changes of force applied and the date of the change.* The plan is further referred to in the following.

Fig. 14 illustrates a case with narrow arches and distal occlusion with a maxillary and a mandibular appliance made as previously described and utilized for expanding and equalizing the arches for a child four years of age. The maxillary appliance has a palatine base wire; the mandibular appliance a lingual base wire; force is caused by bending outward the arms and adjusting the springs of each appliance by rule. With these appliances shown, force for the lateral expansion of the maxillary arch would be caused by grasping with

*Jackson, *Orthodontia* 1904, page 113.

the hands the front end of the arms of the appliance and pulling outward, thus bending the base-wire slightly, which, when inserted in the mouth, would cause force to expand the front part of the arch. In applying force for the *lateral expansion* of the *mandibular arch*, the front ends of the arms should be pulled outward. This would bend the base-wire at the curves opposite the molars which would affect the expansion of the front part of the arch. For expanding the distal part of the arch, one would pull outward on the sides of the distal end of the appliance, which would bend the loop of the base-wire as necessary.

Each of the mentioned changes of form would be governed by the successive measurement indicated on the record card.

As stated a record of the amount of each application of force applied is

Fig. 15.

recorded on the ruled *record card*. (Fig. 15.) When in use this card is supported by a *tracing board* which usually has a hinged ledge, or shelf, for folding over the lower edge of the card. In registering the shape of the appliance it is placed on the card against the edge of the ledge.

With a sharp pencil a tracing is made of the outer contour of the arms and springs of the appliance. A steel pin $1\frac{3}{4}$ inches long is then pressed through the card into the board close beside the arms in the location of each of the canines and molars used for anchorage. With a sharp pencil the prick marks in the card are blackened. When force is to be applied, another prick mark is made, usually one millimeter from the first, in the direction it is intended to bend the arm or spring of the appliance, for causing force. The indicated pin punctures are a permanent record of the successive applications of force, generally of one

millimeter. The arms of the appliance are bent outward to rest against the pins after the added measurements. Each of these indicated changes of force is known as a "step". The first step, generally being one-half millimeter, later one millimeter, should be made at intervals of once a week. When the regulating is advanced considerably and it is desirable, visits may be made once in two weeks or even at longer intervals.

In some cases, it is wise not to advance in the movement too rapidly, although a change of more than one millimeter is often made without discomfort to the patient. In the expansion of the arch laterally, it generally requires a change of only a few millimeters. From each step recorded on the record card, a line is extended upward for recording the date of the change.

The card is ruled from above downward, forming columns, and the date of

Fig. 16.

Fig. 17.

the change in the appliance is made to agree with the new tracing and is inserted in the column at the right.

A light line is drawn from the date to the dot mark, which completes the record of the change that is made.

Every subsequent change in the shape of the appliance is recorded by one or more dot marks as required and the date noted in the column in the same manner with a line connecting them.

If a change is made in two or more springs the same date, the lines extending from the dot marks to the date should converge.

With an appliance supported with spurs as referred to, there would be no pressure caused on the gum tissue and by following the plan of the record card, that is, indicating only short distances or *steps* by the dot marks, and leaving an interval of seven days between visits, the patient can be assured that there will be no pain or especial discomfort in the regulation of the teeth.

Generally, only a few definite steps on the *record card* and corresponding changes in the appliance are required to move the teeth as far as desired. Changes for the application of force should never be made by guesswork but always according to the record card.

IMPROVED ANCHORAGE WITH LOCKING DEVICE

The writer will now refer more particularly to the *improved method* of anchoring regulating appliances for the equalizing of the maxillary and mandibular *dental arches*, and which method may be utilized for causing all necessary movements of the teeth.

MAKING APPLIANCES

To make these appliances (Fig. 16) a broad collar with a buccal lug located to rest near the gum in the center of the tooth is cemented to each of the maxillary and mandibular canines, *A.A.*, and a broad collar with a buccal lug located near the gum is cemented to each of the maxillary and mandibular distal molars of the arch "*EE*".

After the collars are cemented in place, accurate plaster impressions of the teeth and models are made; the models represent the collars *with lugs or tubes in place*.

In making an appliance for the maxillary arch, partial clasps are arranged on the lingual side of the anchorage molars and canines, the partial clasps resting on the collars represented in plaster and, when desired, partial clasps are also arranged on the intervening teeth.

When the distal part of the arch is broad enough, a palatal base-wire "*X*" is planned to cross the arch opposite the last molars with the arms extending forward and shaped to rest on the partial clasps arranged on the lingual side of the anchorage teeth.

The appliance is retained to the teeth by wire clasps which are soldered with the partial clasps, spurs and ends of the semicircular spring to the arms of the appliance with *chemically pure tin* by using the soldering iron. Two wire clasps "*FF*" are shaped to extend from the distal part of the anchorage portions of the appliance, one on either side, to clasp the second molars chosen for anchorage. The free end of the clasp is made to pass above the lug "*E*" on the collar and bent backward upon itself, forming a rather long hook.

The wire clasps "*CC*" attached to the anterior part of the anchorage portions of the appliance, one on either side, are shaped to extend over the arch at the junction of the lateral incisor and canine. They fit well in the groove and reach near the gum line on the buccal surface of the canine, where each is bent backward in a curve to pass above and engage with the lugs on the collars located in the center of the teeth. The end of the clasp is curved forward on itself, forming a hook.

The wire clasp passing above the lug on the collar for anchorage completes the *locking device* of the appliance. In this manner, the appliance is held firmly in position for causing any movement of the teeth.

The appliance is easily removed by unhooking or unlocking the clasps from the lugs with the finger, which liberates the appliance. This can be done either by the patient or the operator.

The hook-shaped end of the clasp makes it the best form of attachment to grasp with the finger nail for unlocking the appliance.

A hook of this shape is thoroughly suited for the adjustment of rubber

equalizing bands as for the correction of protrusion of the maxillary arch or for a prognathous mandibular arch.

By the use of an appliance with a palatine or a lingual base wire and a correct tracing to direct the changes, the expansion of the arch is made easy and progressive, *step by step*, in the manner described in connection with the record card.

An appliance for the expansion, or the equalizing of the mandibular arch is made with a lingual base wire No. 10, 11 or 12 gauge. (Fig. 17.) It is anchored to the teeth with wire clasps. The *locking device* is arranged the same as in the maxillary arch for retaining the appliance.

A lingual base wire is shaped to follow the lingual curve of the arch. The front part, back of the incisors, rests just below the gum line and extends backward and downward to the posterior molars where the ends are curved forward, extending to the canines, forming arms to rest on partial clasps arranged on the lingual side of the anchorage teeth.

The ends of these arms are tapered by filing, so that the front anchorage portions will not be bulky, but they are kept sufficiently large to retain their strength.

The arms are soldered with the other parts—partial clasps, wire clasps, finger springs and spurs as described.

Curved finger springs, as shown, are often utilized in reshaping the line of the incisors between the canines.

The appliance is removed by disengaging the wire clasps from the lugs with the finger.

Fig. 18 illustrates a front view of the maxillary and mandibular dental arches with the teeth in occlusion after correction on each of which the appliance is arranged in position.

The plan of the locking device for anchorage and the semicircular springs of the appliance for moving the incisors are especially shown.

EQUALIZING THE DENTAL ARCHES, ANTEROPOSTERIORLY

Fig. 19 shows the original occlusion of the teeth in the case just described and illustrated by Figs. 16, 17 and 18. It shows the receding mandibular and maxillary protruding arches with appliances in place for their correction, by equalizing the dental arches. Fig. 18 shows the case after treatment.

By the term "equalizing the maxillary and mandibular dental arches" is meant the making of the unequal arches equal, so that the teeth of each arch will occlude normally with the teeth of the opposite arch.

In equalizing the dental arches, anteroposteriorly, the distance between the maxillary canines generally needs to be increased to properly accommodate the four maxillary incisors and to permit the mandibular arch to be moved forward as it should be and the maxillary arch moved backward as necessary.

It often occurs in cases of this type of irregularity that the maxillary or mandibular incisors are too prominent and need to be moved inward to complete the equalizing. This is generally accomplished by the use of a semicircular spring with U-shaped loops, shown at "*D, D'*", arranged to pass in front

of the incisors with the ends of the loops attached to the anchorage portions of the appliance.

Added force is caused by closing the loops of the spring slightly at a time.

Should the mandibular canines occlude detrimentally with the wire clasps of the maxillary appliance at any stage of the regulating, the clasps could be changed to pass from the appliance back of the maxillary canines and rest above the lugs on the collars rather than in front of them. The front part of the appliance could then be dressed away as necessary.

Sometimes when the incisor teeth of the maxillary arch are too prominent, they should not be moved inward until the teeth of the lateral maxillary divisions of the arch are forced backward to a normal occlusion in the process of equalizing, after which a labial semicircular spring should be attached for moving the four incisor teeth inward to take a good line with the canines which just previously had been moved backward in the line of the arch. With this plan the normal lateral occlusion of the teeth being first established, the

Fig. 18.

Fig. 19.

maxillary anterior protrusion can then be more thoroughly reduced by moving the incisors inward.

For cases requiring the maxillary or mandibular incisors to be moved outward, finger springs are attached to the anchorage portion of the appliance, one on each side, extending forward in a curve to cause the necessary force, as shown in Fig. 17 or, a semicircular spring with U-shaped loops can be employed for this purpose, it being attached to the anchorage portions of the appliance.

For this and all purposes, the advantage of having regulating appliances built in *divisions*, as the intermaxillary and the lateral maxillary division, will be readily understood.

SUSTAINING BAR—FIG. 19

In equalizing the dental arches anteroposteriorly, it is sometimes necessary to sustain the anchorage teeth in a manner that will keep them in an upright or perpendicular position, while force, as by rubber equalizing bands, is applied for moving forward or backward the maxillary or mandibular arches and during their retention.

For the purpose of sustaining the canines of the mandibular arch, a small tube a little shorter than the width of the collar on the canine as shown in the figure, is soldered to the distobuccal surface of the collar, usually in a perpendicular position, there being also a lug on the buccal surface of the collar shown at "A" used for anchorage.

A collar with a similar lug is cemented to each of the canines.

For sustaining the molar in an upright position, to the buccal surface of the collar, there is soldered a horizontal tube "G"; this is a little shorter than the anteroposterior measurement of the molar to support the end of the sustaining bar and to serve as a lug for the wire clasp "H" of the appliance.

Through the tube on the molar is passed a wire, usually No. 18 gauge, extending forward following the gum line to the canine, where it is bent into a small perpendicular loop, the end entering the tube on the collar from above downward. With the bar entering the tubes in this manner, it sustains the anchorage teeth as anterior or distal force is brought to bear on them. The bar is known as a *sustaining bar*. Any other teeth in the arch can be sustained in a similar manner. When it is desired to sustain the anchorage teeth of the maxillary arch, the same plan described would be employed. In either case the sustaining bar is not often necessary.

If the second molars are not sufficiently erupted for anchorage, the collars should be cemented to the first molars, but it is always advisable to have the anchorage of the distal part of the appliance as far back in the arch as is practicable.

The force of the rubber equalizing bands in equalizing the dental arches should be sufficient to cause the movement to be rather prompt, and it is well that the equalizing hooks in the plane of the maxillary and mandibular arches be not located too near together—that is—to have the hook for supporting the equalizing band to the mandibular arch and the hook to hold the band of the maxillary arch a considerable distance apart in order to stretch the equalizing band sufficiently to cause a proper amount of force; at the same time, by having the hooks further apart, the band would not interfere with the patient in opening the mouth, as in mastication, without causing much additional stretch of the equalizing bands.

When more force is necessary, a longer stretch of the equalizing bands can be attained by soldering another wire hook to the molar wire clasp to rest back of the lug on the collar.

The hook is shaped and bound to the wire-clasp by a piece of ribboned metal. The latter is prepared by rolling very thin a soft and small-sized bronze wire. After rolling, one side of the metal should be slightly tinned and wound twice or more around the parts to be joined with the tinned side in, then soldered so that the solder, when applied with flux, will follow the tinned surface of the metal, which would suck the solder in around the wires and make a strong joint. With this plan, the equalizing hook will be extended backward nearly the width of the molar.

Another plan of locating the equalizing hook further back in the arch is to shape a spring wire about No. 16 or 17 U. S. standard wire gauge to be

attached to the lingual side of the appliance and to extend backward as far as desired, then bent in a curve to the buccal side of the arch, where an equalizing hook is attached to rest in line with the buccal side of the molars.

To increase the force of the equalizing bands before the permanent canines are erupted, it is sometimes advisable to attach a rigid wire extension to the front part of the apparatus. This is usually arranged to pass through the space caused by the loss of a deciduous canine or a deciduous molar to the buccal side and to extend forward as far as the lateral incisor and there have an equalizing hook attached. In this case, the front part of the appliance is to be retained to one of the teeth, as a premolar or a deciduous molar, by a locking device in the usual way. When not sufficiently well sustained in that manner, a collar with a suitable labial lug for its support should be cemented to the lateral incisor.

Occasionally, for anchorage, when several of the deciduous teeth in the front part of the arch are absent, equalizing hooks are attached to the loops of a semicircular spring that is arranged to pass in front of the incisors. This spring is retained by a collar with a labial lug, cemented to each of the lateral incisors. When this form of apparatus is used, generally a lingual semicircular spring is adjusted to prevent the incisors from being forced backward in the arch as labial equalizing force is applied. These extensions are applicable to each arch for causing greater force and are necessary in certain classes of cases.

As a greater or less force is often required, it is advisable to keep in stock *equalizing bands* of the same size but of different tensions.

In expanding the arch laterally, as previously described, or in moving the teeth too rapidly, they are liable to become tipped outward abnormally. This is often noticeable as in moving the canines laterally outward in providing more space for maxillary irregular incisors. The tipping can be easily prevented and the teeth moved bodily by the *anchorage-locking device* described. A *spur* or *shelf* of plate metal, such as has been recommended, is attached to the lingual side of the collar used for anchorage at the gum line. The apparatus is made to rest on the lingual shelf, and the wire clasp extending from the apparatus, is shaped to rest above the buccal lug on the collar as shown.

Fig. 9 and Fig. 16 A. By this arrangement, the appliance resting on the lingual shelf and the wire-clasp extending to the buccal side of the tooth and pulling on the lug, the canine is held in a perpendicular position as force is applied in moving it bodily outward. If at any time the canine is not sufficiently perpendicular, the end of the wire-clasp can be made to pull harder on the buccal lug and so force the root more bodily outward, or the force can be gauged to give the canine the position desired.

In a similar manner, a premolar or a molar can be moved outward bodily, by having the appliance rest on the lingual shelf attached to the premolar or molar collar and the wire clasp, shaped to extend from the appliance back of the molar to the buccal side to pull on the buccal lug provided. Added force is caused by bending from time to time the end of the wire clasp so it may pull harder on the lug.

In equalizing the dental arches anteroposteriorly, when there is a considerable force on the mandibular molar caused by the stretch of the equalizing band pulling forward and upward on the lug of the collar, it sometimes tends to tip the crown of the molar inward and the apex of the root outward. When this occurs, it is readily prevented by soldering a lingual lug on the collar facing gingivally, and shaping the appliance to catch underneath the lug. At the same time, a wire clasp that extends from the appliance back of the molar, is fitted to rest or press on the upper surface of a buccal lug provided for righting the position of the molar. When desired, as in equalizing the dental arches, the end of the clasp can terminate in an equalizing hook for holding an equalizing band.

For promptly tipping the tooth more upright, the buccal portion of the spring is bent downward to press more heavily on the buccal lug, while both

Fig. 20.

Fig. 21.

this force and the force of the equalizing band is lifting upward on the lingual lug.

In such a case, the wire clasp would be made of larger wire than usual to be sufficiently stiff promptly to cause the necessary force; the force being governed according to the desired amount of bodily movement of the root of the molar, so as to give it a more upright position.

The same principles of anchorage would apply in either of the cases described, and is applicable for causing the similar movement of any teeth in the arch.

When the molar wire clasp is properly adjusted for anchorage, the ordinary force in regulating seldom changes the position of the molar.

In further considering the subject of the equalizing of the dental arches, we shall examine the facial features of one or more cases and call attention to some necessary points in their diagnosis. In cases of maxillary protrusion, it is always advisable to examine carefully the facial line and determine whether the mandible is sufficiently prominent, or whether it should be made more

prominent. (Fig. 20.) This is usually determined by the study of the profile facial line, by holding upright with the hand toward the patient, a small pencil or straight-edge, and sight across it so that the line from the eye will rest on the forehead and, at the same time on the point of the chin, and from this determine whether the chin is sufficiently prominent or too prominent

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25.

to compare with the line of the forehead and balance well with the features. In this case it was determined from examination that the mandible was practically prominent enough. In order to demonstrate this principle more fully, it is usually wise to ask the patient to move the mandible forward as much as would permit the mandibular teeth to interdigitate with the teeth of the maxillary arch as shown in Fig. 21, from which it will be seen by examining the changed facial line that both the mandible and the maxillary arch would be

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much too prominent. Therefore, for the correction of this condition, it requires more particularly, the reduction of the prominence of the maxillary arch and, accordingly, in equalizing the arches in this case, the lateral maxillary divisions of the maxillary arch should first be moved backward sufficiently to occlude properly with the teeth of the mandibular arch. With our plan of equalizing the dental arches, this is easily accomplished, as all of the mandibular teeth would form an anchorage for moving backward in the line of the arch, a less number of teeth in the maxillary arch, as the molars, premolars and canines, until they rest in normal occlusion with the teeth of the mandibular arch. The prominent maxillary incisors should then be moved inward to occlude properly with the mandibular incisors by attaching a semi-circular spring with loops to the apparatus for the purpose, thus reducing the prominence of the maxillary arch. The intermaxillary force employed should be continued to counteract the force of the labial springs in moving the incisors inward.

There is a vast variety of neglected cases that should be treated by the

Fig. 26.

orthodontist. He is sometimes called upon to meet extreme conditions. Figs. 22 and 23 illustrate an important example of a trying case. By studied treatment, marked improvement was brought about in the facial lines and in the occlusion, as shown by Figs. 24 and 25.

CHANGES IN THE MANDIBLE

In equalizing the dental arches, anteroposteriorly to any extent, there are always changes taking place in the shape of the mandible, principally at the location of the angle, caused by the necessary intermaxillary force.

It is essential that all details of this movement and changes caused by equalizing the arches be understood by the orthodontist. It is important to him in the diagnosis, the laying out of a general plan of treatment and indicating in the different stages the best method to pursue; as an example, when the mandible arch has distal occlusion, with the incisors antagonizing with the gum just back of the maxillary incisors, or a case with moderate distal occlusion. This condition has been successfully treated by utilizing the normal *occlusal*

force in depressing the lower incisors and, at the same time, changing the shape of the mandible by adding to an upper regulating appliance a *metal shelf* attached to the arms of the appliance. The shelf is shaped to fit the lingual curve of the incisors and project backward enough so that the lower incisors, when in occlusion, would rest upon the shelf, not permitting the molars and premolars to occlude.

In such a case, the appliance should be well anchored and supported to resist the force in mastication. (Fig. 26.) For the latter, a looped spring wire should be shaped to pass around the tapered cusp of each of the upper canines, and rest near the mesial and distal surfaces, with the ends of the wires extending toward the gum passing underneath the shelf to which they are soldered. With this arrangement, the shelf is strongly supported and, when the

Fig. 27.

appliance is kept constantly in place, would gradually change the angle of the mandible through the force caused by the action of the mandible in attempted mastication with the six mandibular anterior teeth resting on the shelf in occlusion, with none of the other teeth occluding. The shelf is sometimes made level, but when the arches need equalizing, it is tipped forward more or less so that, when the mandibular incisors rest upon the incline of the shelf, they would slide forward drawing forward on the mandibular arch. In occlusion this force, in effect, downward and forward on the anterior part of the body of the mandible gradually causes the angle of the mandible to become more obtuse and the body of the mandible to move farther forward, thereby tending toward normal occlusion.

This change in the angle will be better understood by reviewing the plan

of the development of the mandible and later by its treatment. With the young child the ramus is short and the body of the mandible is short. The body of the mandible in its further development gradually becomes longer from the symphysis to the ramus to accommodate each developing deciduous tooth in its regular order of eruption and continues its development to accommodate each of the erupting permanent teeth in their successive order. The eruption of the third molar seldom occurs before the age of 18 to 21 years. During this time the ramus portion of the mandible is undergoing a similar progressive development at the angle, contributing to the length of the body and ramus. By this it will be understood that the region at the angle of the mandible is in a constant developmental stage from the beginning of the life

Fig. 28.

of the child to that of the adult, and accordingly, its cellular arrangement during this period is more easily changed by any steady, constant force.

The anatomical changes in the mandible from infancy to old age must always be kept in mind in our diagnosis. The angle of the ramus and body of the mandible in infancy is obtuse and through normal development of the body and the ramus it gradually becomes more nearly a right angle about the adult period or later, but as one advances in life, the angle of the mandible again becomes more obtuse.

Fig. 27. In continuing, cases with more defined distal occlusion require in their correction, intermaxillary force for the equalizing of the dental arches by the use of rubber equalizing bands. As stated, in bringing about normal occlusion, one should fully understand the changes that are to take place in the form of the mandible. In masticating, the normal movement of the angle

of the ramus portion of the mandible backward and forward *scribes a section of a circle*. When the mouth is opened, the angle of the ramus approaches the lowest point of the circle and, when the mouth is closing, the angle of the ramus moves forward in the circle to a higher level. The continued equalizing force in moving the teeth forward to correct the distal occlusion gradually bends and raises the distal part of the body of the mandible and molar teeth upward to a higher level in relation to the incisor teeth which generally antagonize with the gum back of the maxillary incisors, in effect, bending the forward part of the body of the mandible downward. As this is done, the mandibular molars are caused to occlude further forward to a normal position in relation to the maxillary molars by the ramus becoming more obtuse; also the mandibular incisors are brought to a lower plane to occlude normally with the maxillary in-

Fig. 29.

cisors (Fig. 28.) This is caused by the lower end of the ramus with the body of the mandible being drawn forward by the force of the equalizing bands attached to the apparatus opposite the maxillary canines and to the distal mandibular molars, the force of which bends the mandible at the angle, thus causing the ramus to take a more obtuse angle in its relation to the body of the mandible.

Through these changes, the ramus retains the same normal temporomandibular articulation through the normal action or strain of the muscles and ligaments, while the lower end of the ramus that joins the body of the mandible, swings forward and upward in the circle as in the act of mastication. The circle that it scribes represents the length of the ramus from its articulation to the angle where it joins the body of the mandible. As the lower end of the ramus at the location of the angle is drawn forward by the force on the teeth in equaliz-

ing the arches, it will be noted that it swings the lower end of the ramus in the line of the circle; this raises the body to a higher level and the farther the teeth and body of the mandible are moved forward by this force, the more the mandible is bent at the angle.

In equalizing the dental arches anteroposteriorly, it sometimes occurs that the continued force in equalizing would cause the angle of the mandible to become too obtuse, resulting in the front part of the body of the mandible being bent downward more than it should be, often causing *lack of anterior occlusion of the teeth*, and at the same time if the force be further continued, it would cause the body of the mandible to move forward too far, tending toward a prognathus condition. (Fig. 29.)

This generally results from a mistake in diagnosis and treatment, as the body of the mandible should not be moved forward in any case during the process of equalizing more than to gain a normal occlusion and a good profile. In equalizing, if lack of anterior occlusion of the teeth is taking place, the equalizing should be discontinued and the mandibular arch sustained, while the teeth of the maxillary arch should be forced backward more to bring about the desired normal occlusion.

In cases when there is a moderate lack of anterior occlusion, the teeth can

Fig. 30.

be readily elevated for its correction by cementing a collar with a *labial hook* to each of the teeth exhibiting lack of occlusion and extending a wire finger spring from the appliance, usually at the junction of the first premolar and canine to the buccal side of the arch, shaped to follow forward in the curve of the arch to rest in the hooks on the collars provided. The spring should be bent downward from time to time for the purpose of elevating the teeth as desired. (See Fig. 30.)

For additional force, a collar with a hook-shaped spur pointing downward can be cemented to one or more of the mandibular incisors on the canines and an *equalizing band of small diameter* be applied to the hooks arranged in the maxillary and mandibular arches, or the band be passed over the spring extending from the appliance and stretched to the hooks of the opposite arch. When the arches have been equalized and the front teeth elevated, they generally require long retention.

In the correction of lack of anterior occlusion of the dental arches, which generally improves the appearance, it should first be determined from the action of the *patients' lips*, when smiling, whether the maxillary or the mandibular teeth with their sockets should be elevated. A method that has been common

in practice with the *writer* for a considerable number of years in elevating the teeth for lack of occlusion, as of four incisors, and at times including the canines and, when necessary, the premolars and molars, is to cement a collar with a labial hook to each of the teeth to be elevated. For the mandibular arch, the hooks should point downward, and for the maxillary arch, they should point upward.

The hooks are made of plate metal and the ends made long enough to bend around a labial bar. (Fig. 30.) The bar of 19 or 20 gauge is curved and rests in the hooks provided, and the hooks are made long enough to be bent around the bar to clasp it when in place. An appliance with a palatine base wire strongly anchored, as described, has a spring-wire arm extending from the appliance over the arch at the junction of the canine and premolar and extends forward on the labial side close to the teeth near the gum where the arm terminates in a side bend to hook over the bar and back of it, between the central and lateral incisor, one arm on each side of the arch. The arms are to be bent

Fig. 31.

Fig. 32.

downward or upward, a little at a time once a week as required for the elevation of the teeth. The appliance is readily removed by unhooking the springs from the bar. This is convenient both for the patient and the operator. The plan is especially suited for moving the teeth and for their long retention. An appliance of a similar plan is utilized for the depression of incisors.

Cases of *true prognathism* accompanied with *lack of anterior occlusion* can usually be corrected by the uninterrupted application of external force on the mandible over the mental process at the symphysis by the use of a *chin cap* and *cranial cap*, causing the ramus to become less obtuse, permitting the body of the mandible to bend upward with the incisors, bringing about normal occlusion.

A SPECIAL FORM OF A REMOVABLE REGULATING APPLIANCE

The appliance to be described is arranged for the treatment of a case with narrow maxillary arch with prominent canines, the lateral incisors now resting near the first premolars, requiring the general expansion of the arch for the full accommodation of the canines and establishment of good occlusion.

For anchorage, Fig. 31, there is soldered to a collar a U-shaped piece of plate metal or a small loop of wire about No. 16 with two short *projecting arms or spurs* extending lingually, one above the other. One arm is slightly longer than the other to act as a shelf for sustaining the base wire of the appliance, the shorter one holding it in position.

These spurs often in the form of a *wire loop* are generally attached to the lingual side of a collar cemented to each of the anchorage teeth, usually the first premolar and distal molar on each side of the arch, the loops in this case being attached to the collar rather near the junction of the teeth to permit the base-wire of the appliance, when in place, to rest on the surface of the collar and side of the anchorage teeth.

Fig. 32. With an appliance anchored in this manner, *tubes* for supporting springs for moving individual teeth can be attached to any part of the base wire, or the springs be soldered directly to the base wire. The appliance can be easily removed for making necessary changes and readily readjusted.

With the appliance illustrated, a *tube* is soldered to each arm of the base wire for sustaining the ends of the lingual semicircular spring with U-shaped loops. To the semicircular spring back of the central incisors at the median line is soldered a small additional curved spring with the ends projecting like arms resting on the lingual side of the central incisors and laterals with the ends terminating on the distal surface of the latter. The free ends of the spring or arms are bent outward from time to time for moving the laterals outward and forward, while all of the incisors are forced forward as desired by opening the loops of the semicircular spring. At the same time, the arch is being expanded laterally by opening the loop of the base wire.

Fig. 33 outlines the full plan of the appliance. It is readily removed from the teeth by grasping one arm opposite the second premolar and forcing it lingually a little to unlock it from the spurs on the collars described. As the appliance is removed, the semicircular spring can be withdrawn from the tubes to permit any necessary change of form of the spring or of the base wire. The appliance is readily readjusted to the teeth by placing one of the arms of the base wire into the U-shaped supports on one side of the arch, pressing in that direction on the other arm of the appliance to lock it in the U-shaped supports on the other side of the arch.

ANOTHER FORM OF ANCHORING APPLIANCES

A desirable plan of anchoring a removable appliance with tubes or eyelets on collars cemented to anchorage teeth, having any form of base wire to which springs may be attached is given below.*

"When one is accustomed to the use of collars for anchorage, this system is utilized by anchoring a base wire as follows: A collar, with a tube soldered on the lingual side, is cemented to a distal molar and to one of the bicuspid on each side of the arch. The tubes can be arranged on the collar at any angle varying from the horizontal to the perpendicular. A heavy lingual or palatine base wire is held in place by soldering to it a small, strong wire in position to

*Jackson's Orthodontia, page 88.

enter the tubes. Wires entering the tubes on the molars are sometimes arranged to hook into the tubes from the distal end, while similar wires are attached to the base wires to enter either horizontal or perpendicular tubes on the bicuspids. When tubes are arranged perpendicularly on the collars, they are generally inclined a little either forward or backward to improve the anchorage, so that when force is applied, the apparatus will not become dislodged. A labio-buccal base wire is anchored in a similar manner. When desirable, all of the tubes can be arranged perpendicularly. The anchorage teeth are prevented from rotating, when extreme stress is put upon them, by soldering the tubes on the

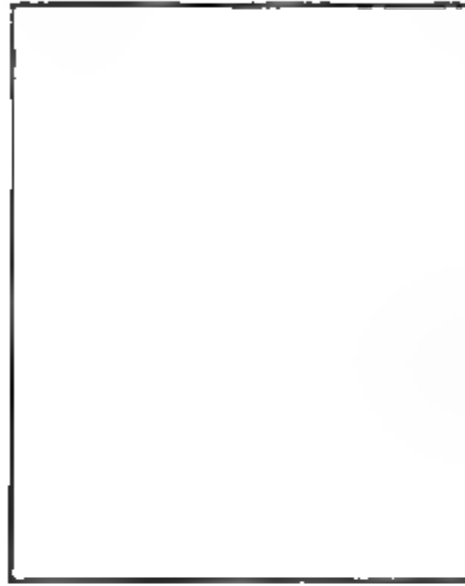


FIG. 33.

mesio-lingual or the disto-lingual surface of the collar, according to the strain to be applied."

The author has endeavored to present in this paper the more important principles of his system of orthodontia and trusts that the suggestions may be of permanent value.

DISCUSSION

Dr. L. J. Porter, New York City.—I had the privilege of looking over Dr. Jackson's paper although I shall not attempt to discuss it, because I feel that I am incapable of discussing the principles of the Jackson appliance from the little experience I have had with it. However, there is one question which I would like to hear discussed, and that is the question of changing the angle of the mandible. I think it has been said by some of the bigger men in our profession that in carrying the mandible forward, the condyle will slide forward in the glenoid fossa. If that is true, we can show better by Dr. Jackson's apparatus there what I mean. If the whole mandible is carried forward, will not the condyle slide forward in the glenoid fossa? If the mandible is held in position and the lower part of the mandible is carried forward, the angle of the mandible undoubtedly changes, but if the mandible at the same time is being carried forward in the glenoid fossa, will not the anterior teeth resting on that bite plate be depressed before the angle of the jaw is changed by muscular action before the elastic ligature is used?

Major Joseph D. Eby, Washington, D. C.—There has been a most peculiar sense of pleasure and feeling of gratitude mingled in my thoughts which I have enjoyed while sitting in this audience and following Dr. Jackson in his paper, after three years away from active orthodontic practice although busily engaged in work involving the active principles of the science.

My thoughts, the while, have been racing back through the vista of fifteen years' as-

sociations with Dr. Jackson's system employed in active practice, recalling his many acts of kindness, his glowing friendship, what his work has really meant to me and—the thousands of his appliances which I have made.

It would be inappropriate at this time to dwell on the evolution of orthodontic apparatus further than to call attention to some points which are relevant to this paper; viz, the fact that present-day working apparatus can be no longer classed into the two former divisions—"Fixed" and "Removable."

Our present knowledge of the correct control of tissue changes in the physiological processes attending tooth movement by mechanical stimulation has substantiated the active principle which Dr. Jackson recognized in his first efforts to produce an apparatus employing the accurately measured liberation of spring and elastic forces.

Science is solving the question of the dynamics of orthodontia so that progressive thoughts must turn from autocratic and arbitrary ideas and become centered, not upon the kinds of forces to use, but upon the questions of anchorage, design and control of stimulation, not power, the very thing which the Jackson system has embraced for years.

Now since modern progress has brought practically all useful appliances to meet on this common ground, the fact exists that Dr. Jackson's present apparatus are equally as stable in anchorage, stationary in applied stimulation and none the less dependent upon the patients' cooperation than any other appliances using adjustable springs, contemporaneous points which have been until recently generally acclaimed as disadvantages.

Mechanically, the modern Jackson apparatus requires a mastery in technic of construction, more so, perhaps, than many other appliances which embody similiar principles but when once the skill is developed by the operator, the following advantages are to be found:

1. Relative ease of construction.
2. Great latitude of design.
3. Ease of insertion.
4. Exact control of stimulation.
5. Ease of alteration to meet advanced conditions.
6. Durability.
7. Favorable location.
8. Remarkable balance between the problems of anchorage and applied forces.
9. Comfort to patient and operator.
10. Accurate control and adjustment.
11. Hygienic.
12. Volume and quality of production.
13. Excellent retainer.
14. Aids the forces of occlusion.

There are many other salient points about Dr. Jackson's appliance, one other, at least, to which I desire to call special attention: In the majority of malocclusions, there are certain segments in arches, particularly in the posterior regions, wherein certain groups of teeth are in correct relations and if they are shifted en masse, the phenomenon produced in the alveolus is altogether different from that made by an appliance which acts against the teeth individually.

In the Jackson apparatus, the side arms or the extended "finger" springs may be made to engage groups of teeth so as to transpose them in a block movement.

Radiographic observation of this condition invariably reveals the fact that the socket lining, the lamina dura, or the pericemental lamella, remains intact and tooth movement results from the absorption of more cancellous alveolus adjacent. In comparing this advantage with individual tooth movement, some of the following facts are suggested:

1. Movement expedited.
2. Teeth retain alignment.
3. Dentinal ligament, periodontal membrane, laminated socket lining uninjured.
4. Retention more rapid and assured.

It seems to me that this is a point in tooth movement to which due regard has not been paid, should be one of the most important points in selective design of apparatus and in arch stimulation particularly, is practically idealized in the Jackson system.

The observations which Dr. Jackson makes in the changes occurring through the angle of the mandible in equalizing the occlusion, whether by anterior or posterior movement of the mandible are correct to my mind and the manner in which he has demonstrated it with the diagrammatic model is most unique.

I first awoke to the full realization of this truth after hearing a paper read by Dr. Chalmers J. Lyons entitled "Impacted Lower Third Molars" in which he elucidated this point beautifully from the standpoints of development and the causative agencies which produce the condition of impaction.

One of the most substantial points to consider is the fact that the ramus is composed of two very heavy plates of corticle bone with very little medullary process between them and is posed to best resist any transitory changes in response to mechanical stimuli made either anteriorly or posteriorly.

It is true that the neck of the condyle is made of cancellous bone but this is only evidence to the fact that owing to its heavy investiture in connective tissue (being fractured much less frequently than the angle) makes it far more resistant than at that point where the ramus and body merge. Dr. Jackson's observations in changes at the angle have been further demonstrated (painfully) in the follow-up treatment of numerous gun shot wounds through the angle in which soldiers had worn "open-bite" splints for several weeks, in all of these cases where solidification had taken place, an artificial prognathism and open-bite nonocclusion existed, requiring tedious orthodontic treatment to correct.

This fact in its simplest interpretation, demonstrates that the elevating and depressing muscle groups must be reckoned with and that the angle is the center of compensation between them.

If it is remiss for me to depart from the thoughts in the paper, I desire to receive indulgence while I express a thought which has weighed very heavily in my mind for several years and in so doing, I am sure I am expressing similar feelings of hundreds of others.

Since the publication of the first edition of Dr. Jackson's book, he has so completely revolutionized so many parts of his system until the orthodontic world is asking for knowledge which can only be gained in glimpses when Dr. Jackson presents something personally. If, instead of devoting his life to the comparative few whose privilege it is for him to serve, he would only produce a modern illustrated text in the form of his second edition, he would record for our profession and to human kind a contribution, not only needed at present, but by the generations to come, thereby engraving his name more everlastingly into dental history and gaining the fullness of the reward which his great life's work so nobly merits.

Dr. William H. Gilpatric, Boston, Mass.—I have a set of slides illustrating the different apparatus and their various movements, but the hour being so late, and not wishing to encroach upon Dr. Case's paper, if you will allow me, I will show one or two cases illustrating the different types of movement and have the remainder printed in the Journal.

One point Dr. Jackson did not emphasize, and that is the importance of registering pressure applied to any appliance. It is my opinion that with every appliance used, we should be able to control the forces, and know the amount of tooth movement in a given time.

Another point which Dr. Jackson did not lay sufficient stress upon is the importance of using large base wires and large finger springs. It was my opinion, at one time, that Dr. Jackson was using too heavy a base wire and finger springs, but after a thorough trial with smaller ones, I am convinced that the heavy base wires and finger springs, which he recommends, are superior for cell stimulation. Some of the men who are unfamiliar with the Jackson appliance criticize the heavy base wires on account of bulk, but in the past fifteen years, I have used the Jackson appliance in the mouths of physicians, teachers, and vocalists, and have never had a complaint.

One of the great advantages of the Jackson appliance is the ease with which repairs and additions can be made.

After the appliance is made, we gold plate it with 24 karat gold, and on each appointment, the patient's appliance is immersed in a saturated solution of cyanide of potassium.

During the past few years, there has been a great land-slide towards the removable retainer. A retainer of this type is more easily constructed, more easily adjusted, and less liable to breakage than the vulcanite.



Fig. 1.



Fig. 2.

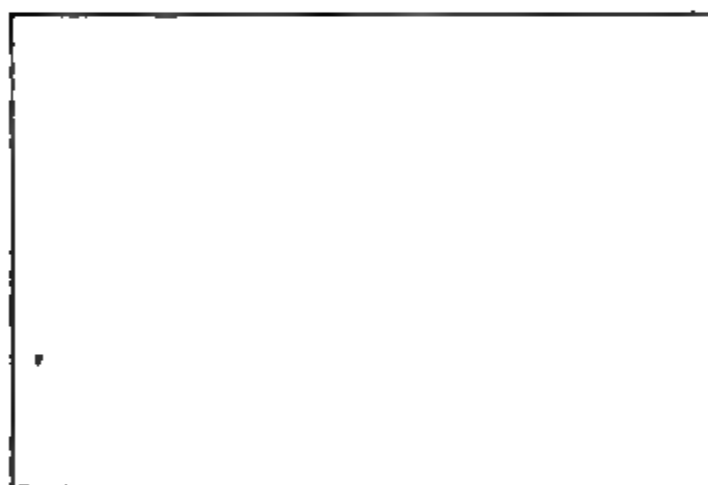


Fig. 3.

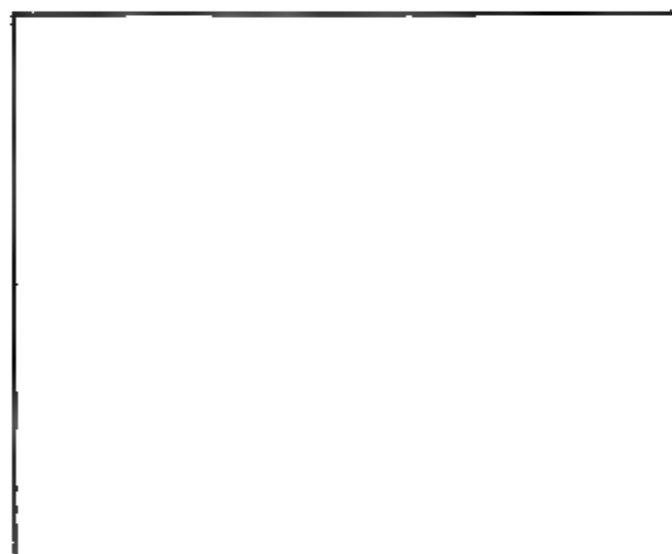


Fig. 4.



Fig. 5.

Fig. 6.

The slides which I shall show are of practical cases, made from working models, that is, after the appliances are constructed, we photograph both models and appliances, before placing the latter in the mouth.

Fig. 1 illustrates an appliance with a loop to open up space for an impacted second bicuspid and to move the first bicuspid and cuspid mesially. The anchorage for the appliance is obtained from the left six-year molar, first and second bicuspid and cuspid. On the right, from the six-year molar.

Fig. 2 illustrates the new Jackson anchorage so-called, although Dr. Jackson has used this for the past 15 or 20 years. The upper has collars upon the six year molars and the temporary cuspids. The lower has the same anchorage.

Fig. 3 illustrates the appliance constructed upon the model. (Note the inside semicircle against the centrals.)

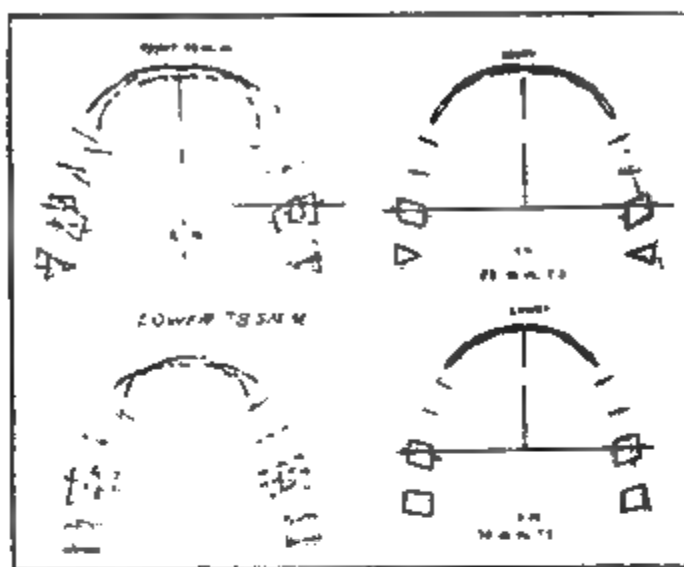


Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 4 illustrates the models in occlusion, appliances in place with the intermaxillary rubbers. (Note the labial wire on the lower to relieve pressure from temporary cuspids.)

In these mesial occlusion cases you have the resistance of four teeth on each side plus the two centrals as the palatal wire rests at the gingival margin and the labial wire at the inside edges.

Fig. 5 illustrates the case of a young man 19 years of age with excessive overbite so that in masticating his food he was shearing off his lower anterior teeth.

Fig. 6 shows palatal view of same.

Fig. 7 shows lingual view of lower.

Fig. 8 shows the surveys of the upper and lower arch, on the left side, right side, progress to date.

Fig. 9 shows the palatal view of the same case to date.

Fig. 10 shows lingual view of lower.

Fig. 11 shows models in occlusion. Note the change in overbite due to the tipping buccally of the lower molars and bicusps, and the correct moulding of the upper and lower arches.

Fig. 12 illustrates appliance for the expansion of the upper and the bringing together of the centrals.

Fig. 13 shows appliance upon a lower model with individual finger springs for individual movement of the bicusps.

Fig. 13.

Fig. 14.

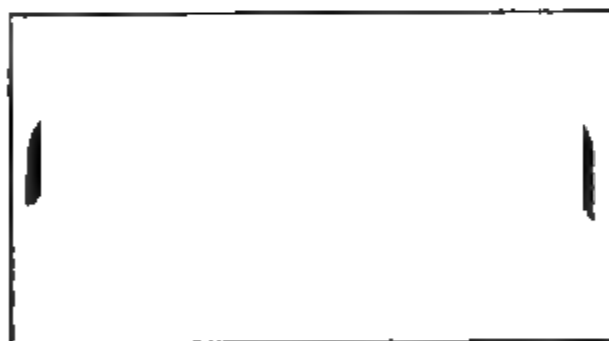


Fig. 15.

Figs. 14 and 15 illustrate a retainer to retain the molars and bicusps with a labial wire to prevent the anterior teeth from moving mesially.

There is a final point I wish to emphasize and that is, in case too much force is applied, the appliance can be removed.

I wish to express my gratitude to Dr. Jackson for all the inspiration and help he has given me. I assure you it was a great honor to have the privilege of being associated with him in his office.

Dr. Jackson (closing the discussion).—In replying to Dr. Porter's question: "If the whole mandible is carried forward, will not the condyle slide forward in the glenoid fossa?"

This is an important question and should be thoroughly considered and understood. It is nature's plan that the condyles of the mandible be held back in the glenoid fossa as far as they can rest through the action of the *sustaining muscles*.

In incising the food and, in speaking, the mandible is necessarily moved forward by the action of other muscles as required, which puts the sustaining muscles on the stretch. A similar effect results when equalizing force is applied to the teeth. Continued force for

equalizing the dental arches, drawing *forward* on the teeth and the lower end of the ramus, while the sustaining muscles are on the stretch, drawing *backward* on the condyloid portion or upper end of the ramus, gradually causes the angle of the mandible to become more obtuse.

In equalizing the dental arches it occasionally occurs, when this force is applied continuously for a considerable length of time, that the sustaining muscles supporting the upper end of the ramus become exhausted from this, a too exacting force, permitting the condyle to be drawn forward as far as the capsular ligament will allow. By this relaxation of the sustaining muscles, the mandible is often permitted for the time, to rest farther forward than would be a normal occlusion of the teeth, when by the operator's examination of the occlusion at this stage, finding the mandibular arch resting anteriorly, he might be deceived by the position of the teeth and conclude that the angle of the mandible may have become too obtuse, when in fact it had not been changed. This being the case, the equalizing should still be continued, until the angle of the ramus becomes sufficiently obtuse to cause the condyle to rest normally and, at the same time have normal occlusion of the teeth.

As stated, when the equalizing force is removed and the condyle is fully at rest, it should normally be held back as far as can be in the glenoid fossa by the sustaining muscles.

In diagnosis, when this is doubtful, the condition should be fully determined by the operator and, if the muscles are still inactive and it is difficult for the patient to move the mandible backward at will, the sustaining muscles are usually brought into action for that purpose, by inducing the patient to laugh or to swallow, which invariably stimulates the muscles to draw the condyles of the mandible back to a normal position. Then the operator would know by examination of the teeth, whether the desired normal occlusion, as required, is being established as result of the angle becoming more obtuse.

Dr. Porter in discussion also asks: "Will not the anterior teeth resting on a bite-plate be depressed before the angle of the jaw is changed by muscular action, before the elastic ligatures are used?"

In my paper, I referred to depressing the incisors with their alveoli by the use of an upper lingual shelf attached to any ordinary regulating appliance. This is an important method of depressing incisors especially for young patients when a moderate change is required.

The angle of the mandible is often changed by this plan of treatment particularly when the shelf of the appliance is arranged to project downward and backward, in effect in occlusion, pressing forward and downward on the mandibular incisors and canines, and when used continuously for some time.

When a more excessive change of the angle and depression in the region of the incisors is required, in addition to the occlusal force of the mandibular teeth on the shelf, the equalizing force should be employed.

Dr. Eby has understood the principles of my plan of constructing and managing regulating appliances so well and from his experience has spoken so enthusiastically about the value of the plan that I desire to commend his discussion. I am pleased that he has mastered the subject and has presented it so thoroughly in his teaching, that he has an unparalleled following of enthusiasts.

Dr. Gilpatric's presentation and discussion is in full keeping with the purpose of my paper and I want to thank him and each of the speakers for their thoughtful and kind consideration of the subject and of me. I have been extremely anxious to so perfect my appliances that their use may conduce to the true welfare of humanity.

LAWS OF BIOLOGY REGARDED AS ETIOLOGIC FACTORS IN MALOCCLUSION*

BY CALVIN S. CASE, M.D., D.D.S., CHICAGO, ILLINOIS

GENERAL PRINCIPLES OF BIOLOGY

BEFORE proceeding to a study of those malocclusions which arise partly, and to a large extent, from some form of heredity, it is important for the student to be informed in regard to the general laws of biology upon which is dependent the entire scientific basis of that which pertains to this branch of our subject, so that he may have a more intelligent appreciation of the various propositions presented along this line.

The science of biology lies at the very foundation of all knowledge pertaining to living things—their origin, development, propagation, and all coordinating and environing influences. Unfortunately, the principles of biology and general evolution are quite commonly regarded, even by people who pride themselves upon their education, as of no more practical value than the sciences of astronomy and geology; whereas, there is no branch of learning which enters so intimately and extensively into other branches that are regarded as the essentials of life and education.

While this is particularly true in the general practice of medicine and dentistry, there is no branch in which the laws and principles of biology are of such importance as in the study of the causes and treatment of malocclusion and dento-facial disharmonies, because they present an authentic foundation for a broader understanding and application of the possibilities of ethnologic influences in the admixture of different types of races, and in the union of physical disharmonies everywhere. Therefore, a brief epitome of biologic laws seems essential to an intelligent comprehension of certain principles which enter so largely into the etiology of malocclusions. It is hoped, moreover, that this will stimulate students to a more extensive study of this important branch of literature.

Biology and biologists deal only with the natural laws of organic evolution. By long, patient, and scientific investigation, biologists verify every proposition over and over again before it is stated as a scientific truth. These pertain principally to the problems of life, heredity, variation, natural selection, and influences of environment.

Every anatomic form or structure—barring inhibited development—which arises from the *Law of Heredity* is laid down in the metabolic activities of the

*This article is revised from the third of five chapters of Part II, entitled "Etiology of Malocclusion" in the forthcoming revision of "Dental Orthopedia" by Dr. Calvin S. Case. The first chapter entitled "Etiologic Principles of Malocclusion with Reference to Treatment," was published in the September number of Dental Items of Interest; and the second chapter entitled "Etiologic Influences of Deciduous and Erupting Permanent Teeth with Principles of Treatment" was published in the March issue of this Journal. The titles of the subsequent chapters, which we hope to publish in consecutive numbers in this Journal are: "Heredity and Variation Ethnologically Considered," and "Practical Application of Biologic Laws."

germ cells at the time of fertilization, and forced upon the offspring by the laws of reproduction.

Fortunately, there is another law which is quite as important in biologic development as the law of heredity. This is the law of *natural variation* which also lays down in the germ cells the elemental beginnings of variations which arise in the offspring that differ from the parental stock and like those of heredity are capable of being propagated to future generations.

The other two laws, *Natural Selection* and *Environment* may be said to act extrinsically—the one being Nature's selection of those whose qualities are best adapted to the environment and propagation of their kind; and the other deals purely with adaptive variations in structure, etc., which fits them a little better to live and thrive in the environment into which they are thrown.

This presents two important truths: First, no physical form or variation in anatomical structure can arise except through the channel of the germ cells, though the environing influences upon already endowed properties of the individual after birth may result in a more adaptive degree of development. Second, it shows the impossibility of appreciably increasing the inherited sizes or forms of any of the bones by local or environing stimulation.

HEREDITY

The *Law of Heredity* is that which determines the propagation of physical forms, structures, peculiarities, and even traits of character. Its importance along these lines is clearly related by J. Arthur Thomson, of Aberdeen, in his recent book, *Heredity*: "There are no scientific problems of greater human interest than those of heredity; that is to say, the genetic relation between successive generations. Since the issues of individual life are in great part determined by what the living creature is, or has to start with, in virtue of its hereditary relation to parents and ancestors, we cannot disregard the facts of heredity in our interpretation of the past, our conduct in the present, or our forecasting of the future."

Those who have not given much thought to the subject of heredity are accustomed to think only of *direct* heredity, or the inheritance of some physical peculiarity or characteristic which had its existence in one of the parents; whereas, this is only one of the many forms of heredity. It may be a blending or composite union of quite distinctively different features or family types belonging to both parents harmoniously or disharmoniously united in the offspring; or it may be that the undiluted forms or features of one parent will be found closely associated in the offspring with the characteristic features of the other parent, as the large nose, ears, jaws, or teeth of one parent in connection with the smaller and more delicate features of the other parent.

How often do we see beautiful children from homely parents, because of the transmission to the child of those special features of the two physiognomies that harmonize in union? On the other hand, how often do we see plain and homely children from parents whose physiognomies individually are symmetrical and attractive, because of the transmission to the child of a combination of the features of both, which being dissimilar in size are inharmonious in union? As

the osseous framework is the principal medium that characterizes the various forms, even the large teeth of one parent and the small jaws of the other—though never claimed as more than a rare occurrence—will probably continue to be placed among the causes of irregularities by intelligent dentists, especially as it can be so easily verified.

The condition in question may be some physical or mental peculiarity which had no existence in either parent, but which obtained in some more distant forebear. This *Atavistic Heredity* may have passed without recurrence through many generations, to suddenly manifest itself in the offspring without any apparent known cause; or it may have arisen from an exceedingly complicated propagation under the forces of natural sexual selections, similar to that which is produced by artificial selection or hybridizing, demonstrated by what has been achieved in the past in regard to horses, cattle, poultry, pigeons, fruits, flowers, etc.

Among the vast number of trial and experimental efforts along this line, there has been discovered a number of almost unbelievable laws of heredity which are as dependable, when the exact requirements are fulfilled, as *direct heredity*. One of these is known as "Mendel's law." A further consideration of the subject of heredity in its various phases and practical application to diagnosis and treatment of malocclusion, will be found in other chapters.

NATURAL VARIATION

Next in importance to the laws of *Heredity* is the law of *Natural Variation*, without which everything would have repeated itself from the start, and consequently there would have been no science of biology or organic evolution. One of the stable peculiarities of all living structures is the production of variations in otherwise original hereditary forms and characteristics. These *natural variations* which innumerable arise in all living things are commonly very slight, varying in degree from the almost indiscernible to marked or anomalous modifications from the typical or inherited type. All *natural variations* invariably arise during the metabolic activities of the germ cells in both plants and animals, and when once started are under the same transmissible laws of heredity as those of the established lines of heredity; the difference being, the latter are not so likely to become extinct because of their established adaptability to environment; whereas, *natural variations* are quite likely to be unnecessary, or opposed to their environment, and, therefore, not being stimulated toward continued development, soon die out in future generations. On the other hand, the variation may be one which more perfectly fits the individual for the struggle of life and a higher adaptation to the requirements of environment. In this event, the variation becomes one of the stable forms of heredity, along with other variations which have arisen in the same way, thus fulfilling the highest function of this particular law in the great work of evolution, and in the development of species.

Natural variations which begin with, or are inherited by, the individual are quite as likely to be in disharmony as in harmony with progressive develop-

ment. The difference being that those which are contrary to the needs of life are not as capable or as prolific, and consequently die out.

It may be well to state that the law of *natural variation* has no reference in biology to perceptible physical changes in structure that arise or that may be produced in individuals from the adaptive forces of environment, or from local causes, or any form of artificial stimuli. All forces which arise from extrinsic causes have little or nothing to do with biology proper, because that kind of variation is not transmissible, except when the cause and its results obtain through many generations so as to finally become a natural variation.

Moreover, physical growth enlargements or "bone growths," which are caused from extrinsic forces, other than those which arise after inhibited developments through a revivification of functional activities, are never of a normal structural character, and certainly never result in healthy interstitial growth of the bones to the extent of carrying their development to a larger than their inherent size or form. This assertion is made advisedly, basing it on the opinions which have recently been obtained from some of the most advanced authors and teachers of biology, and which hardly accord with the somewhat recent propaganda promulgated by certain orthodontic teachers relative to the fantastic possibilities of "bone growth."

NATURAL SELECTION

Darwin's law of *natural selection* is not, as is popularly supposed, the selection of mates through instincts and qualities of the individual, or sexual selection, but it is that which was intelligently stated by Huxley when he invented the term "*survival of the fittest*,"—in other words, Nature's selection of those who are best fitted for thriving and procreating their kind amid the environments into which they are thrown.

When individuals in plant or animal life are forced to exist amid environments in which they are not physically adapted, or are under destructive influences, against which they are not fully protected, they gradually diminish and die out; though adaptive natural variations may arise in certain of the offspring, similar to adaptive artificial variations which are forced to arise in cross-breeding and which tend to restore the species to the possibilities of progression.

ENVIRONMENT

In the struggle of life, the influences of *Environment* are exerted very strongly upon each individual toward the production of adaptive qualities and variations in form, to render them more fitted for sustaining their lives amid the surroundings into which they are forced. Whole libraries have been written upon this phase of biology alone, but in all these volumes adaptive variations induced to arise in the individual after birth are rarely considered as factors in biologic development, because, as stated before, they are not transmissible, and certainly one finds nothing in regard to the possibility of producing adaptive or harmonizing physical growths in the framework of animals after birth by mechanical or any other stimuli, because biologists are engaged with problems of *natural* reproduction and development.

Such variations in the individual are seen at times in plants whose roots and limbs reach out after moisture and sunlight, but rarely if ever in animal life; except perhaps in superficial tissues, with no effect upon the framework or skeleton, except in instances of inhibition, resulting in diminished growth. What does occur and through the forces of which all the various forms of life and species have sprung, is: an offspring appears, among the many, with a *natural* or an inherited variation, perhaps induced in fertility by the stimulation of needs which surround the parents, resulting perhaps in only a slight change in form or structure, and yet sufficient to make life easier and more vigorous, and capable of greater protection, and possibly more attractive to mates, with increased chances of reproduction. Thus from generation to generation other adaptive variations are added—and inherited by the offspring—the higher adaptive qualities crowding out the weaker.

The neck of the giraffe and the necks of its million progenitors, back to the first variation which marked the beginning of this type, did not grow to its present length by increasing the inherited lengths of its seven cervical vertebræ during the lives of each of the successive individuals, even though strongly stimulated by the demands of hunger and repeated efforts to reach higher for its tropical foods. Every marked change in the slow development of these adaptive qualities arose first with some *natural variation* in the offspring, which added a little to the length of the vertebræ of the neck, giving them a better chance; and in the next, or some succeeding generation, another slight adaptive variation arose rendering them still more fitted for the environment, and so on, through myriads of variations to the present form. During these long periods, those who were less fitted were dropped from this progressively developing species by dying out, or by becoming a factor in the development of some other kind of animal, through being forced into a different environment for food, protection, etc.

The science of organic evolution which is now accepted by all competent biologists asserts that variations in plant and animal types, through all the past and present forms of life, have not originated because of the stimulation of use or influences of environment, but they have arisen solely because, first, of the *law* of "natural variation," and second, the law of heredity, through the admixture of dissimilar types. Not the smallest portion of an extra cusp of a human tooth ever started to develop because of use or needs that were not first laid down in the germ cells of that individual through the laws of heredity or natural variation. The influences of use and environment are *subsequent* forces upon already endowed forms and qualities, adapting the fitter types of life to the needs of surroundings, and stimulating them to more vigorous growth and reproductive activities.

What these unseen guiding forces are—or any of the objective qualities of all natural forces—we probably will never know in this life, or anything beyond the subjective cognition of the phenomena produced. No one can intelligently contemplate the probable forces which have been at work during the millions of past years in the origin and development of organic life from its simplest form

up to man, without a profound feeling of awe for the unknowable guiding forces which set in motion and control this orderly sequence of events.

The men who have been devoting their lives to the possibilities of these laws in the biologic field, in patient and painstaking investigation, tell us that these are the only ways in which structural variations in organic life are brought about. This is not to underrate the important part which environment plays in the great work of evolution. Nature selects only those whose endowments permit them to live, and those who possess the more adaptive qualities are to that extent more capable of coordination, development, and propagation. They are, moreover, better fitted through their vigor to aid in the transmission of those adaptive natural variations which they may have been the very first to possess.

It can be seen by this that there are three great laws which have produced and governed organic evolution, i. e., Heredity, Natural Variation, and Natural Selection. Influences of environment upon individuals through immediate adaptability to surrounding conditions are of far less importance, as has been explained; and yet a coordination of environment with natural selection has led to the preservation and continuation of those which are naturally best adapted to thrive, and the weeding out of those which are incapable of adaptation to the environment.

Thus it has been with everything, everywhere throughout the past ages in the developmental processes toward surrounding us with untold variety of living things. When one begins to comprehend the wonderful coordination and interdependence of the forces of heredity, variation, natural selection, and environment, a far far deeper veneration and love arises for the great Prime Mover of all things.

Man steps in and discovers these laws and their action, and then with his artificial selective breeding facilities, he hastens the operation—that is all. He does not alter or add to it one single biologic law that Nature has not employed through aeons of time. While this is wholly true in the science of biologic evolution, the wonderful work which man has accomplished in the last fifty years, and particularly in the past few years, in creative chemical transformation of the organic compounds, which were supposed not long since to arise only from vital living forces, is something which now far outstrips the works of Nature—freely demonstrated in the chemical transformation of the coal tar products and their creative combination with other compounds.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

DENTAL RADIOGRAPHY*

BY S. GILBERT SCOTT, M.R.C.S., L.R.C.P.

I. THE USE OF THE OBLIQUE RAYS IN DENTAL RADIOGRAPHY

THE practical radiologist makes use of various methods of his own which he has found to be of value by experience. These practical "tips," to use the term, are not as a rule included in books on radiology.

One is taught that the central ray should always pass through the part being examined in order to prevent distortion. This is perfectly correct in most cases, but one never hears a good word said for the oblique rays, which may be employed to advantage in overcoming difficulties by those who know how to use them.

I have been making use of the oblique rays for some years past and have found them of great practical value in examining various parts of the body.

The radiographic examination of teeth in general is not always easy; and many radiologists dislike this "fiddling job," as they term it. Knack, experience and a good eye, used in conjunction with the oblique rays, are required to render the examination consistently successful. Many a film is wasted because on development the extreme tip of a root is found to have been missed altogether. If the oblique rays are used correctly, this elusive part of the root will be found to have been thrown well on to the film.

The method can be easily demonstrated by making use of the light given off from the spiral of a Coolidge tube. The tube is placed over the couch and a dried skull utilized. If, for example, we place the lower jaw on its side and displace the tube across its long axis, the shadow of the jaw nearest the tube will move in the reverse direction. In this way it will be noted that the shadows of both halves of the jaw are interposed when in the center of the illuminated field, but clear of each other when the oblique rays from either

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hemisphere are utilized. Fig. 1 explains the method diagrammatically. Thus, in radiographing the lower jaw, it is necessary to center the tube on a spot well below the level of the jaw itself and rather behind its angle. In order to get a correct idea as to the exact position in which the tube should be placed, it is not a bad plan to watch on the screen the displacement of the shadows produced by the movement of the tube and tilting of the part under examination.

The same method is utilized for displacing the shadow of a tooth on to the film placed in the mouth, but owing to the fact that the distance between the tooth and the film is small, the displacement is proportionately less, although at the same time this will be found sufficient to show the whole tooth, where the lower half would probably have been missed.

In actual practice one should visualize what one is aiming at. Thus, in order to throw the shadow of a tooth lying in the upper jaw downwards on to

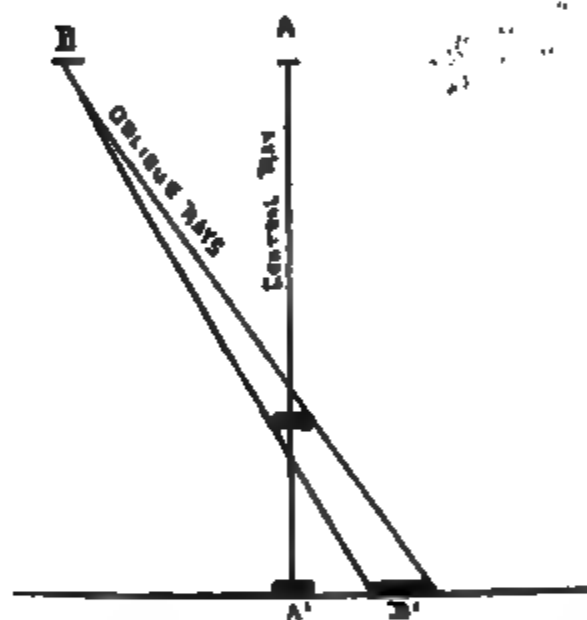


Fig. 1.—Showing displacement of shadow by oblique ray.

Fig. 2.—Lower jaw Chin. (Quarter plate in mouth.)

the film, the central ray must fall somewhere on the frontal bone, and in the case of the lower teeth it would be quite six inches below the lower jaw. If one works with the tube above, the limit of one's field must be known, otherwise it may be found that in the effort to make full use of the oblique rays, the film has been placed outside the illuminated area. The tilting of the tube is unnecessary and frequently defeats one's object.

The best position for the head can only be found out by experience, and depends on the part of the jaw under examination.

It might be expected that distortion of the image would result from using the oblique rays as described, but this is negligible so long as the film lies more or less in the same plane as the tube.

I have only given a very rough outline of this method, and it must be understood that it is necessary to use one's ingenuity to obtain its full practical value. I think, however, sufficient has been said to indicate how the oblique rays may be made use of, and I must leave it to each one's ingenuity to work out their practical application.

II. THE USES OF A QUARTER PLATE IN DENTAL RADIOGRAPHY

The point of the chin and the floor of the mouth are not easy regions to radiograph satisfactorily. A few words as to the technic used to overcome certain difficulties may, I hope, be found of practical value to the radiologist. In describing the following method I am taking it for granted that the tube is above the patient. The operation may be divided into three stages:

1. Placing of the patient's head.
2. Insertion of a quarter plate into the mouth.
3. Placing of tube.

Fig. 3.—Calculi in Wharton's duct. (Quarter plate in mouth.)

Fig. 4.—Right side. Upper jaw and roof of mouth. (Quarter plate in mouth.)

1. The patient lies on his back and a large sand-bag is placed under the shoulders, so that the head is thrown back as far as possible.

2. The next stage is the placing of a quarter plate with its envelop inside the mouth—at any rate, half of it. To many this may sound impossible, and if one compares the narrowest side of the plate to one's own mouth, this doubt may appear well founded. But the adult mouth is very elastic, and the making a mouthful of a quarter plate is easily accomplished with a little coaxing and lubrication. Needless to say, it is hardly a becoming operation, and if tried on

oneself it is some time before the feeling of the artificially-produced grin wears off. It is unnecessary to cover the plate with waterproof, and in the case of children, where the insertion is necessarily more difficult, but in most cases possible, the outer black envelope may be discarded, the inner red one being carefully fastened down right up to the corners. Those plates sold already done up in double wrappers are the best, as they fit tighter and so lessen the breadth of the mouthful. A little vaseline smeared on the long edges of the plate and in the corners of the mouth will ease things considerably.

The fingers should be used as miniature shoe-horns assisting the first part of the operation and the plate gently pushed home. The amount of plate that disappears into the mouth is rather astonishing. Remember to place the film downwards.

3. Now see that the patient's head is as far back as it will go and tilt the tube so as to bring it into the same plane as the plate, or as nearly so as possible.

It is hardly necessary to say that the sooner the operation is over the better will the patient be pleased.

The method has only been described in detail for examining the lower jaw and floor of the mouth, but it will be readily seen that it can be equally applied to the upper jaw, and if skillfully used by one with a good eye—most of the teeth of one side can be shown altogether on one quarter plate with little or no distortion.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Treatment of an Infection of Dental Origin with Subcutaneous Injections of Electric Colloidal Silver. T. Estéoule. *La Odontologia*, 1920, xxix, No. 10, p. 435.

The good results obtained in general medicine with standard solutions of colloid metals in the treatment of pneumonia, typhoid fever, sepsis, etc., suggested the idea of utilizing them in infectious conditions following upon inflammatory complications of dental origin (abscess, phlegmon, and so forth). The author reports a case illustrating the advantage to be derived from this therapeutic measure in dental medicine. Electric colloidal silver was employed by him, in small grains, in the course of treatment of a phlegmon of dental origin. The patient, a girl of 19 years, presented a dental abscess due to fourth degree caries of the second right lower molar, with periosteal tenderness. She refused immediate extraction of the tooth, and antiseptic mouth washes were prescribed. Two days later, the swelling increased in size and the edema extended beyond the median line; the tumor appeared hard, nonfluctuating, and the profuse saliva was mixed with pus. These local symptoms were associated with constriction of the jaws and grave general phenomena, fever, severe headache, and insomnia. The patient finally consented to extraction, which proved very difficult, on account of the trismus, and almost bloodless. The maxillary constriction slightly improved, and some yellowish pus exuded from the alveolus. The condition remained stationary for about a week, when it became considerably worse, with intolerable pain and a high temperature, complete trismus and dysphagia. The tumor was very large and hard, the skin red and glistening. The edema extended from the eye to the clavicle, lending considerable size to the neck; the movements of the head were very difficult; it was evidently a case of submaxillary phlegmon. Irrigations of the alveolus with hydrogen peroxide brought large amounts of fetid greenish pus and a small sequestrum. Slight improvement during the next few days was followed by a serious aggravation, with a high fever, well marked dysphagia and a considerable diminution in the amount of pus voided from the empty alveolus. A cutaneous incision of 2 cm. was now applied parallel with the lower maxillary border, from which thick offensive pus escaped in large amounts. The pus gradually became less abundant, the trismus subsided and the patient

could sleep, although the temperature still persisted high. In the presence of these indications of a deep infection (persistent fever, edema, offensive pus, general prostration), a subcutaneous injection of 10 c.c. of electrargol was administered, with very favorable results. On the next day the pus had diminished and a subcutaneous injection of 5 c.c. of electrargol was applied; the same dose was repeated at the end of twenty-four hours and continued for the next week in daily injections. By this time all inflammatory symptoms had disappeared, the patient was able to open the mouth and eat as usual, so that her strength promptly returned under a nourishing diet and tonic measures. The cure in this case was due to the combined effect of the evacuating incision and the electrargol, which by itself alone would have been incapable of arresting the evolution of the inflammatory process. Incision is imperative in the presence of a collection of pus, but nevertheless the action of the electric colloidal silver on the toxic infectious phenomena accompanying the development of the tumor (high persistent fever, continued flow of fetid pus, physical and nervous depression) was very evident. The rapidity with which these symptoms disappeared and the rapid return of strength show the very powerful bactericidal action of the colloid silver, as well as its effect upon the defensive forces of the organism.

Alveolar Infections of Dental Origin as seen by the Roentgenologist. H. W. Dachtlér. *The American Journal of Roentgenology*, 1920, vii, No. 6, p. 302.

The difficulty of both the recognition and the management of dental infections is emphasized by the author, who points out certain mechanical aspects of dental roentgenology due to which all positive results are exceedingly valuable, whereas negative results may be misleading and therefore dangerous. The customary set of ten films to cover the teeth, although sufficient in many cases, is inadequate in many medical cases where a number of dead teeth are present. In order to establish the existence of an abscess, a certain angle is often required, many times not the normal one, to render the abscess clearly visible. In some cases it is necessary to resort to plates on the outside of the jaw to determine definitely whether or not an abscess exists. The configuration of some mouths is such as to preclude the obtaining of absolutely diagnostic films of some of the teeth. In the upper molar region, some abscesses cannot be detected, owing to the angle that the film makes with these teeth and the angle at which the tube must be placed to show the roots at all. Arthritic and nervous patients are not desirable subjects from the viewpoint of diagnostic dental roentgenology.

The interpretation of the films gives rise to other difficulties which can be overcome only on the basis of past experience. Areas of bone atrophy with disappearance of the lime salts at the apex of a tooth always mean infection in some stage. In view of the extreme susceptibility of bone-tissue to infection, it is not to be expected that the dental surgeon can enter the alveolar process without infection in many cases, absolute asepsis being practically impossible. Owing to the nature of alveolar bone, infections in it tend to enter the blood stream early and with certainty, giving rise to secondary manifestations. It is noteworthy that in early cases of very bad secondary infections, perfect films

may show such slight changes that these are easily overlooked. The size of the abscess bears little relation to its danger.

Etiology, Symptoms and Treatment of Alveolar Pyorrhea. Clemm. *Zahn-aerztliche Rundschau*, July 26, 1920, xxix, 29.

Referring to the debate concerning the origin of this affection, whether due to a spirochete or to some unknown complex, the author blames the vague picture of pyorrhea for the conflicting opinions. Holders of certain opinions have been misrepresented in argument. Thus Beyer is said to have seen in the spirochetes which yield locally to salvarsan, a single disease group capable of causing stomatitis, pyorrhea and under certain conditions noma. But Beyer has never made such statements. As far as the author understands him, he merely holds that by mutation from a common strain several pathogenic forms may have been developed. The author's claim that alveolar pyorrhea has ended fatally has been criticized because he did not exclude the possibility of such affections as septic endocarditis due to osteomyelitis, but he regards this as hardly worthy of notice. The severe crises of pain in pyorrhea are not due to periostitis but are common in the very chronic cases of atrophy of the alveoli. Nor are they due to pulpitis which might, of course, be present incidentally. The author's critics are also wrong when they state that extraction of a loosened tooth makes an end to pyorrhea. In two cases cited by the author the symptoms persisted in part after extraction of the affected teeth, but disappeared after blood injections of salvarsan. In the severe crises of pain just mentioned intravenous salvarsan has produced not only relief but permanent disappearance. The author would not perhaps go as far as the French in making a spirillum the sole cause of alveolar phthisis. Time only can solve this riddle of mouth spirochetosis and pyorrhea. In the meantime the author will not attempt to cure the latter by pulling loose teeth.

Etiology, Symptoms and Treatment of Alveolar Pyorrhea. Beyer. *Zahn-aerztliche Rundschau*, August 3, 1920, xxix, 31.

In a recent number of this journal Clemm has answered sufficiently certain criticisms directed against his (Beyer's) views of the nature of pyorrhea. He would add only a few remarks. He believes that an insidious stomatitis may sometimes cause pyorrhea. He has clinical data and microphotographs to show that the symbiotic microorganisms of Vincent's disease can bring this about. That gingivitis and stomatitis may precede pyorrhea has been contended since 1909 by most dentists. During that year Senn announced that when the fusiform bacillus dominated the symbiosis the likelihood of pyorrhea was greater—he was referring only to ulcerative cases. The author after studying thousands of slides has found the typical spirochete to be the dominant germ. When this is absent we find only some form of false pyorrhea. One of the author's critics charges that the characteristic of pyorrhea is its latent progress, which statement is challenged—alveolar pyorrhea is always manifest. The symptoms are largely subjective or referred elsewhere than the gums, but persistent bacteriologic studies will discover a certain number of typical spirochetes. All at once an acute crisis is lighted up and now the

germ in question is found in abundance. Sebba, the leading critic of the author, is, of course, forced to deny this claim outright; but the author, who has convinced others, believes that he can convince any one who will follow his technic.

Etiology, Symptoms and Treatment of Alveolar Pyorrhea. Sebba. Zahnärztliche Rundschau, August 3, 1920, xxix, 31.

The author has been for some time opposed in debate to Clemm and Beyer on these subjects. Among the bones of controversy is Clemm's alleged death from pyorrhea which Clemm still affirms. In the published record of the case (1915) there is no personal history and the case is specified as one of "parulis" or suppuration of the jaw. The case history contains nothing to suggest alveolar pyorrhea. The source of the so-called parulis is not given. It is not disputed that pyorrhea may not have led to periodontitis, osteomyelitis and septicopyemia. Certainly there is no attempt to exclude this sequence. But in summing up the author calls the case one of necrotizing alveolar pyorrhea with following septicopyemia. Sebba contends that alveolar pyorrhea does not cause necrosis, hence the case was never one of that affection. He also denies that Clemm's cases of intolerable painful crises were due to pyorrhea alone for periodontitis must have been present. As for the assertion ascribed to him that extraction of the loose teeth alone will cure pyorrhea, he never made so foolish a claim. Having an opportunity to read the mss. of Beyer's most recent article (which appears in the same number) he states that the brilliant results attributable to salvarsan have not been experienced by others; and as for stomatitis slowly bringing about pyorrhea he sees here only an ordinary sequence of disease without causal connection; one might likewise say that prolonged gastritis is the habitual cause of cancer of the stomach.

Undernourishment and Its Effects on the Teeth. Endress. Zahntechnische Reform, August 8, 1920, xxiv, 32.

The paper refers to the undernourishment incidental to the recent war and the effects on the teeth are nothing less than catastrophic. Caries has become pandemic, affecting all strata of society. Lime is the most important single dietary article to consider in this connection. First, there was lack of good fertilizer and then lowered lime content in the vegetables on which the subjects were forced to exist. The calcium of the milk was lost to the diet. It was difficult to hold the temporary teeth until the permanent ones could develop. Caries usually began at the neck of the tooth which aggravated the situation, the tooth soon breaking off. The relation of this rapid caries to acid mouth was difficult to ascertain and act upon. Attempts to correct mouth acidity have disadvantages. The author would attach much more importance to increasing the lime content of the blood. In soldiers the author and others have found marked atrophy of the gums, with increased sensibility of the tooth neck and loosening of the teeth. These changes could not be attributable to calculus deposit but purely to undernourishment. The author has found massage of the gums of value.

Post-influenzal Necrosis of the Palatine Roof. Ritter. *Zahnärztliche Rundschau*, 1920, No. 27.

The patient was an anæmic man 35 years of age, who came under treatment for a severe inflammatory process affecting all the teeth in the upper jaw. The front and canine teeth were quite loose; a well-marked rather circumscribed swelling (parulis) was present above the alveolar margin of the middle incisors, and on pressure large amounts of pus were voided. Back of the incisors was an advanced necrotic process of the hard palate, with round whitish ulcerative and disintegrating nodules. This process extended uniformly on both sides of the middle line as far as about the third portion of the hard palate, and appeared different from ordinary ulcerative stomatitis. This condition, associated with chills and fever, was said to have existed no longer than eight days, and had followed after an attack of influenza. Treatment consisted in removal of the two loose middle incisors, with scraping of the necrotic masses; the instrument reached friable tissue about three cm. in the longitudinal direction of the palatine roof. The entire buccal surface was painted with pure tincture of iodine; alternate irrigations with hydrogen peroxide and aluminium acetate. In spite of treatment, there was no improvement, and the patient steadily lost ground. Before the microscopical examination could elucidate the clinical pictures, he succumbed to general sepsis, under sudden onset of high temperature and extension of the necrotic process to the entire palate.

Cellulitis of and Abscess in the Para-pharyngeal Tissues Causing Laryngeal Edema. C. G. Coakley. *The Laryngoscope*, 1920, xxx, No. 2, p. 65.

Attention is called to a class of cases known as Ludwig's angina, in which there exists a definite pus collection in the region of the submaxillary gland, sometimes in the sublingual glands, and at other times beneath the tongue anteriorly. These cases are accompanied by laryngeal edema, and differ from a type of the disease which runs its course without any discoverable localized abscess formation, but is also associated with laryngeal edema, by the presence of an upward, or upward and backward displacement of the tongue. The author believes that most of these infections come from mouth organisms passing through the mucous membrane of the floor of the mouth or side wall of the pharynx, but some of them come from carious teeth. Several cases of this suppurative type are seen each year in his service at Bellevue Hospital, and all recovered after free external incision into the abscess. In two cases there was such evident fluctuation in the floor of the mouth between the tongue and ramus of the jaw that an incision was made in this region for the evacuation of the pus. While this sufficed in adult patients, the process kept up so long in the case of an infant about one year old, that it was necessary to make a counter-opening beneath the inferior maxilla for adequate drainage.

Four Cases of Maxillary Periostitis with a Fatal Outcome. G. Grandi. *La Stomatologia*, 1920, June 30th.

Four deaths following periostitis of the jaws occurred in the course of the last two months in the Triest City Hospital, a remarkably high mortality in a

a relatively short space of time. In one of these cases, which came to autopsy, it was possible to trace the etiology of the disease and the destructive advance of the bacilli. The patient, a man forty-one years of age, was admitted to the hospital after having suffered for a fortnight from severe mandibular pains on the right side, followed by a swelling of the neck, tender on pressure. Fluctuation could be felt under the chin. The skin was tense and reddened. Treatment consisted in deep incision under the right mandible down to the bone which was found to be denuded of its periosteum. Intravenous injection of collargol. In the course of the next five days the phlegmonous inflammation extended to the temporal region; a deep incision was applied, and the temporal bone was found to be denuded of its periosteum. On the following day, the patient died. The autopsy showed a phlegmonous infiltration of the cervical glands. On cross section, the denuded right maxillary bone was found to be impregnated with blackish pus in its spongy substance. Pus was found in the mandibular canal, passing through the posterior foramen and destroying the articular capsule, then ascending along the temporal bone and infiltrating the brain, where it gave rise to acute purulent pachymeningitis. The septic products of the mouth had penetrated between a molar tooth and the alveolus, causing acute infection of the periosteum which became propagated along the third branch of the trigeminal nerve and reached the meninges. In view of the spongy substance of the right portion of the maxilla being entirely infiltrated with pus, the conclusion is justified that the periostitis of the tooth gave rise to the alveolar periostitis and later on determined osteomyelitic suppuration, the pus taking the above outlined path. The bacilli were evidently extremely virulent; the microscopical examination showed staphylococci and streptococci. In view of the gravity and frequency of these cases of periostitis and osteomyelitis, certain rules should govern the dentist's conduct. In the first place, all injections of novocain, stovain, or derivatives of cocain into swollen tissues should be absolutely prohibited. The author never employs these agents and accords the preference to ethyl chloride anesthesia for dental extraction. When extraction does not provide sufficient escape of the pus, a wide opening should be applied, not merely an incision of the mucosa and the periosteum. The maxillary bone should be trephined and drained, and in all cases, all the purulent foci should be exposed; this alone will prevent the pus from taking a path which may lead to death. The above observation teaches the gravity of these infections, especially as regards their possible results. Patients should be instructed as to the urgent necessity for surgical intervention; delay under these conditions may induce serious disturbances and sometimes death.

Dental Cysts and Maxillary Tumors. Polus. *Le Journal Dentaire Belge*, 1920, No. 4, p. 189.

Four cysts of the upper jaw were operated upon by the author through the alveolar crest, no suture being required. A complete and rapid cure was obtained in all cases. The vestibular route is usually recommended for surgical intervention, and is undoubtedly the procedure of choice for small radicular cysts, with resection of the root and preservation of the tooth. For large

cysts, however, better results are probably obtainable by means of the route through the alveolar crest. The free access provided by this operation permits the control of the cavity after extirpation of the cyst, which is not possible in the procedure by the vestibular route. Another advantage consists in the easy detachment of the cyst without damage and destruction of the walls. The cyst can be reliably extirpated as a whole. The postoperative treatment is easy; drainage takes place automatically and naturally, the wound being in the most dependent portion, which is not the case when the vestibular route is employed. This operative technic requires neither the detachment of a flap of mucosa with the periosteum nor the application of a suture, two very delicate and difficult procedures. A disadvantage consists in the necessary sacrifice of one or several teeth. The operation begins with the extraction of the tooth which causes the cyst and of the adjacent teeth when necessary to provide free access. This is followed by extensive detachment of the vestibular and palatine mucosa, and instrumental abrasion of the alveolar crests. Dissection of the cyst-wall, extirpation of the cyst without damaging its wall, destruction of all membranes in case of rupture of the cyst; examination of the cavity with the electric buccal incisor, to ascertain the completeness of the extirpation. The four essential conclusions arrived at by the author are as follows: (1) Absolute necessity of radiography in all doubtful cases; (2) Intervention by way of the alveolar crest; (3) Packing with iodoform gauze, maximum duration of twenty-four hours; (4) Absolute insufficiency of simple curettage in the treatment of dental cysts.

In the case of a patient 72 years of age, the diagnosis of inoperable sarcoma at the angle of the left mandible had been rendered. On the basis of radiographic findings, the presence of an atypical wisdom tooth which had followed an abnormal course was suspected. Operation was performed and the finger was introduced between the maxillary bone and the upper portion of the submaxillary gland; an incision was applied, and liberated instead of a wisdom tooth, a salivary calculus.

Modern Prosthetic Treatment of Jaw Injuries. De Vecchis. *La Riforma Medica*, 1920, No. 5.

The author gives a brief survey of the treatment of jaw injuries during the war. The main feature consists in absolute fixation, for the avoidance of pain, asymmetrical position, bony crepitation, danger of infection, contraction of scar tissue, pseudarthrosis, and aspiration pneumonia. In recent injuries, irrigations with physiologic salt solution, potassium permanganate solution 1:3000, or hydrogen peroxide, are recommended, for the mechanical removal of septic material. Penetrating gunshot wounds are more common than impacted projectiles. Cooperation of surgeon and dentist is necessary. After the wound has become clean, at the end of six to twelve days, an apparatus is adjusted. No bone-suture is applied on account of the danger of infection. In fractures with a loss of substance, the proper position of the teeth and the bite must be carefully controlled, followed by fixation with a wire bolt which is fastened to the last molars. The width of this wire bolt can be adjusted with screws. In mandibular fractures, the bolt is applied to the upper jaw, gradu-

ally and steadily approximating the fragments by means of elastic traction. There is an appliance consisting of a series of metal caps which are adjusted to the anatomical configuration of the individual teeth and attached to them. These caps bear tubes and screws to which pulleys are attached. A loss of substance is covered by wire bands between the two tiers of molars or in the course of the row of teeth. The fragments are often replaced in one day through elastic traction; the pulley is then replaced by wires, so that the lower jaw is fixed to the upper jaw. The apparatus is left in place for from forty to fifty days, during which time only liquid food is taken. When only a few isolated teeth are present, a strong wire bolt is cemented to the crown, and the elastic traction is then exerted from the points.

Stomatology in Portugal. H. Allaeys. *Revue Belge de Stomatologie*, 1920, xviii, No. 5, p. 251.

The Portuguese Stomatologic Society, planned soon after the foundation of the International Stomatologic Association in 1907, but delayed in its establishment by long years of political disturbances, was definitely created in July of 1919. Portugal, which has nearly six million inhabitants, at present has sixty-eight medical stomatologists, of whom fifty are already registered as members of the new society; these physicians are scattered in part through the various departments of the country, but the majority are naturally residents of Lisbon, the capital, where the pioneer workers in Portuguese stomatology are established. Since 1911, the practice of dentistry and stomatology in Portugal is exclusively restricted to doctors of medicine, and therefore to stomatologists; the new law having no retroactive effect as regards dentists who are not doctors, but have been graduated and in practice prior to that date. While this excellent ruling was of course primarily due to the intrepid procedure of native stomatologists, the International Stomatologic Association has been more or less directly concerned in it since 1907, and as a matter of fact, doctors of medicine alone had access to the section on stomatology at the International Medical Congress held in Lisbon in 1906. The necessary corollary of the Portuguese law of 1911, which restricts stomatology to doctors of medicine, namely the creation of professorships and establishment of courses of instruction in stomatology in Portuguese universities, may be accomplished next year, in 1921, when the first applications for chairs and titles for professors of stomatology will be received. The immediate and inevitable result will be a very appreciable increase in the number of specialists in stomatology, who will not only replace the nonmedical dentists in the normal course of events, but will actually increase both in quantity and quality the number of practitioners of the bucco-dental specialty, to the great advantage of public health in Portugal. Meanwhile, stomatologic services are already fairly generally established in the hospitals, all under expert medical direction and with a medical staff, giving to the young specialist an opportunity for instruction and clinical observation. There is an excellent stomatological service in Lisbon, in St. Martha's Hospital of the Faculty of Medicine, as well as in San Jose's Hospital, and stomatological clinics functionate likewise in the military and naval hospitals all under the care of medical stomatologists.

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EDITORIALS

A Movement to Lower the Standards of the Dental Profession by Admitting Laboratory Men

DURING the past few years various laws and regulations have been enacted by different bodies for the purpose of raising the standing of the dental profession, and it is with regret that we have seen attempts made to render the work of those many years null and void. One attempt is a movement to gain a professional recognition for mechanical men. Just what has been the cause of this, we are unable to say, but it seems to have gained considerable headway and is appearing through channels that would be least suspected.

One of the first attempts to gain recognition for the mechanical laboratory men that would give them a professional standing was noted when a movement was started in a large dental society to admit mechanical men to mem-

bership. When the objection was raised, some of the dentists claimed that any one that would not vote to change the constitution of the society so as to admit dental laboratory men was narrow and selfish. This cry of being narrow and selfish is one that has been raised by some one every time a criticism of any pet scheme has been made. In fact, if the denial of membership to laboratory men in a dental society is narrow and selfish, then we must admit that every dental law that has been enacted for the regulation of the profession has been narrow and selfish, for the very purpose of the dental law has been to keep the unqualified out of the profession. The dental laboratory men are not qualified to become members of the dental societies because they cannot meet the professional requirements of the society or of the dental laws.

The first requirement for membership in a dental society, and also of the one in question, is that a man must have passed a state board of dental examiners. This the dental laboratory man, as a rule, has not done; and if he has, we have no objection to his becoming a member. All members of dental societies have not only been compelled to satisfy the state boards of dental examiners, but they have been compelled to have certain preliminary education before they even were allowed to enter college. These preliminary requirements were enacted for the good of the profession and we are sure it will be doing the profession no good if, by one amendment to the constitution of a dental society, the laboratory men will be given the same privileges of membership that the dentist has acquired by years of work.

We should like to ask of those in the profession who are working to get laboratory men into the societies, whether they are willing to have the dental laws set aside and changed so that any one may take the examination to practice dentistry regardless of education and training? If they are willing to do that, then the laboratory men will have a chance to become dentists and naturally be allowed membership in the state and local dental societies.

Another argument advanced is that we should educate laboratory men and women in our profession to the utmost of our ability, thereby fitting them to do better work. Unfortunately at the present time many states allow men who have not passed the dental boards, to do mechanical dentistry. We hope the time will come when no one may do any part of a dental operation unless he has taken a full dental course. However, so long as dental laboratory men are allowed, there is nothing to prevent any one from training a laboratory man to do certain things. After this man has been trained, we see why the dentist for whom he is working, may try to have him made a member of a dental society. By becoming a member he can be further educated by the membership of the society. This dentist is willing to sell the standing of his profession for the few dollars the laboratory man may be able to earn for him as a result of the membership in the dental society being so lowered to admit an unqualified man.

It has been suggested by some that laboratory men can give valuable aid and assistance to some of the members of the profession. Granting that this is true, which we doubt, we respectfully call attention to the fact that the plumber, the electrician, and many others can also give pointers, but they

are not qualified to practice dentistry, and therefore should not be admitted to membership in a dental society. In citing those who might be admitted to dental societies because they are intimately associated with the practice of dentistry, we might also include the doorman, the elevator boy, and the scrub woman, but we contend that they, like the laboratory man, have not fulfilled the requirements to pass the dental boards, and are therefore forced to go through life without the advantage of membership in a dental society. To claim that the laboratory man is a part of the profession is making a claim that, if proved, would also include the office assistant, the bookkeeper, and a host of others who are as vital to the practice of dentistry as the laboratory man.

We have been accused of being narrow and selfish because we do not believe in admitting to membership in the dental societies any one who does not meet the requirement necessary to practice dentistry. However, speaking of being narrow and selfish, we believe the motive back of the movement to educate and advance the laboratory man is primarily one of selfishness. Some dentists have partially trained laboratory men to do certain work and these members are so selfish that they believe that if the laboratory man can be made a member of a dental society he will learn something that will be a profit to them. Those who are working the hardest to give laboratory men special privileges are not doing it with a view to improving the laboratory men only, but with a view to making the laboratory men more valuable to the individual dentist.

The question of educating the dental laboratory assistants was taken up in a paper read before the National Dental Association in Boston and published in the *Journal of the National Dental Association*. All of the arguments made in that paper can be interpreted to mean that some of the profession want trained laboratory assistants so they can pay the assistant \$50.00 a week and collect four times that amount from the patient. All of the arguments advocated for the education of the laboratory men show that the dentist wants some one to help him make more money so that he can play more golf.

The methods advocated for educating laboratory assistants show that most men who advocate such a thing have little knowledge of the present conditions in dental education. The suggestion that dental colleges educate laboratory assistants is impossible, because dental colleges are chartered to educate dentists and the student must have certain educational requirements to enter the college. If the laboratory man had those requirements, he would study dentistry. If the plan suggested to educate laboratory men were carried out, it would give us a new creation that would be difficult to name.

We have no objection to the laboratory man being educated, but he must have the same education as is recognized by the state board if he is to be admitted to membership in dental societies. Until such educational requirements are met, the attempts to admit laboratory men into societies and to educate them in dental colleges will only be movements that will bring the standing of the dental profession to a level with the laboratory men, for, because of the lack of preliminary education and professional training, it is impossible to bring the laboratory men to the level of the profession.

Announcements for the Journal

THE International Journal of Orthodontia, being anxious to serve its subscribers in the best possible manner, welcomes for publication all items and news notes of interest to orthodontists, dentists interested in orthodontists, oral surgeons, and radiodontists.

Information as to dates and places of meeting of societies of interest to the above specialties, organization of societies, names of officers, etc., is requested.

The Journal is also glad to publish formal announcement cards of those who are interested in the subjects to which it devotes its pages. Requests are constantly being received for names and addresses of orthodontists in the various large cities of the world, consequently we solicit such information for our files.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The Twentieth Annual Meeting of the American Society of Orthodontists will be held at the Ambassador Hotel, Atlantic City, N. J., Wednesday, Thursday, Friday and Saturday, April 27, 28, 29 and 30, 1921.

The Board of Censors have arranged the following program:

Wednesday, April 27, 9 a. m.

Meeting of the Board of Censors.
President's Address.

J. Lowe Young, New York City.

Report of the Board of Censors on new members and the election of officers.

Wednesday, 2 p. m.

The Pathology and Diagnosis of Disto-clusion.
B. E. Lischer, St. Louis, Mo.

The Temporo-mandibular Articulation in the Disto-clusion Case.

A. LeRoy Johnson, Boston, Mass.

The Influence of the Forces of Occlusion on the Development of the Bones of the Skull.

Lawrence W. Baker, Boston, Mass.

Thursday, April 28, 9 a. m.

Studies on the Etiology of Angle's Class II Malocclusal Manifestations.

Milo Hellman, New York City.

The Effect of the War Diet on the Teeth and Jaws of the Children of Vienna, Austria.

Sheldon Friel, Dublin, Ireland.

Thursday, 2 p. m.

Report of Cases Other than Disto-clusion.

I. Finished Neutro-clusion Case.

II. Finished Mesio-clusion Case.

Allen Holman Suggett, San Francisco, Cal.

Report of Case Showing Physical and Mental Development.

Burt Abell, Toledo, Ohio.

Report of Two Cases.

Robert Dunn, San Francisco, Cal.

Report of Case Showing the Loss of Half of the Mandible by Operation for Sarcoma at the Age of Seven Years. Restoration by Bone Grafting Twenty Years Later.

Robert H. Ivy, Philadelphia, Pa.

Report of Three Cases.

Harry E. Kelsey, Baltimore, Md.

Report of Cases Showing "Stimulating Arch Development by the Exercise of the Masseter-temporal Group of Muscles."

Alfred P. Rogers, Boston, Mass.

Report of Case Showing "Closing of Spaces in Mutilated Cases."

John V. Mershon, Philadelphia, Pa.

Report of Cases Shown by Moving Picture Film.

Adelbert Fernald, Boston, Mass.

Thursday, 6:30 p. m.

Annual Dinner (Informal)

Friday, April 29, 9 a. m.

The Treatment of Disto-clusion.

Herbert A. Pullen, Buffalo, N. Y.

Report of Disto-clusion Cases.

I. Report of Case, Class II, Div. I (Angle) with Deep Overbite.

II. Report of Case, Class II, Div. I (Angle) with Normal Overbite.

Herbert A. Pullen, Buffalo, N. Y.

Report of Case, Models of Class II (Angle) before Treatment and Models of Same Case Twenty Years after Treatment.

Horace L. Howe, Boston, Mass.

I. Report of Case Treated with Angle Pin and Tube Appliance.

II. Report of Class II, Div. I (Angle) (Unsuccessful). No Root Movement of Upper Incisors and Cuspids.

J. A. Burrill, Chicago, Ill.

Friday, 2 p. m.

Post-operative Treatment of Class II. (Disto-clusion).

C. A. Hawley, Washington, D. C.

Prognosis of Disto-clusion Cases.

Hugh K. Hatfield, Boston, Mass.

Saturday, April 30, 9 a. m.

Clinics I.

I. Lingual Arch Technic.

H. A. Pullen, Buffalo, N. Y.

II. Lingual Wire Appliance to Move Impacted Cuspids.

Allen Holman Suggett, San Francisco, Cal.

III. Record Models Simplified Technic.

Oliver Wilson White, Detroit, Mich.

IV. A Stable Lingual Lock for Use with Removable Lingual Arches.

Lourie J. Porter, New York City.

V. An Efficient Lingual Lock and Springs.

Ernst N. Bach, Toledo, Ohio.

Clinics II.

I. Locking Device for Lingual Arch. Incline Planes for Retention of Class II Cases.

Horace L. Howe, Boston, Mass.

II. Plaster Impression Models and Facial Casts.

O. A. Oliver, Nashville, Tenn.

III. Direct Method of Band Technic.

Harry T. Deane, New York City.

IV. Improved Record Model.

S. L. Kregarman, New York City.

V. Howard Model Machine and Measuring Instruments. (Designed for Orthodontists)

Joseph D. Eby, New York City.

Clinics III.

I. Complete Clinic on Orthodontic Engineering.

Lionel Hartley, New York City.

II. Lingual Arches and New Orthodontic Pliers.

Adelbert Fernald, Boston, Mass.

III. Jackson Appliances.

Victor Hugo Jackson, New York City.

Saturday, 2 p. m.

Business Session.

Alumni Society of the Dewey School of Orthodontia

The eleventh annual meeting of the Alumni Society of the Dewey School of Orthodontia will be held on April 25th and 26th at the Hotel Ambassador in Atlantic City.

The following program has been arranged:

Monday, April 25th, 1921

President's Address.

Sydney W. Bradley, Ottawa, Ont., Canada.

Early Manifestations of Irregularities as Seen in the Deciduous Arch. Treatment and Report of Cases.

Edward A. Bogue, New York City.

What a General Practitioner Should Know about Orthodontia to Best Serve His Patients.

C. Angus Kennedy, Toronto, Canada.

Changes in Nasal and Oral Cavities as a Result of Orthodontic Treatment.

Martin Dewey, New York City.

Spring Action, Position or Otherwise.

A. C. Gifford, Oshkosh, Wis.

Tuesday, April 26th, 1921

Infra and Supra Occlusion with Lantern Slides.

C. C. Howard, Atlanta, Ga.

The Use and Construction of a Stable Lingual Lock on Removable Lingual Arches.

Lowrie J. Porter, New York City.

The Logic of Heavier Springs in the Physiology of Tooth Movement.

Joseph D. Eby, New York City.

Report on President's Address and Annual Election of Officers.

A Consideration of Bite Planes in Orthodontia.

Victor Hugo Jackson, New York City.

A Study of Facial Expression as Influenced by the Position of the Teeth, Illustrated by Moving Pictures.

Adelbert Fernald, Boston, Mass.

An Original Instrument for Making Bands.

P. L. Salzberg, Brooklyn, N. Y.

Clinics, 8 p. m.

Locking Device for Removable Appliances.

Jas. J. Ford, Jr., Chicago, Ill.

An Efficient Lingual Lock Spring.

Ernest Bach, Toledo, Ohio.

Treatment of Excessive Overbite and Apical Movement of Incisors with the Lingual Arches.

J. Frank Nelson, Chicago, Ill.

A Stable Lingual Lock for Use with Removable Lingual Arches.

Lowrie J. Porter, New York City.

A Fixed Removable Appliance on the Jackson Principle.

Joseph E. Johnson, Louisville, Ky.

Spring Action, Position or Otherwise.

A. C. Gifford, Oshkosh, Wis.

An Improved Record Model.

S. L. Kregarman, New York City

Some Features of the Lingual Appliance.

C. S. Hurlburt, Springfield, Mass.

Appliances for Opening Bite with Retainer for Same.

E. R. Schroder, Alameda, Calif.

Some Right Angle Instruments for Cleaning and Polishing the Teeth and Appliances.

Adelbert Fernald, Boston, Mass.

An Instrument for Appliance Adjustment.

N. C. Leonard, Baltimore, Md.

Original Instrument for Measuring and Trimming Orthodontic Plaster Casts.

C. C. Howard, Atlanta, Ga.

The Southwestern Society of Orthodontists

The Southwestern Society of Orthodontists was organized in Dallas, Texas, March 7, 1921, and the following six days enjoyed a postgraduate course under the direction of Dr. A. H. Ketcham of Denver, Colo., on the subject of the Lingual Appliance, also the Ribbon Arch and Bracket. The organization of this Society fills a long felt want among the Orthodontists of the Southwest. Some twenty-five Orthodontists are located in the States covered by this Organization, and the future looks very bright, indeed, for a prosperous Society. The next annual meeting will be held in Oklahoma City, Okla. The Officers elected for 1921 are as follows: Dr. T. O. Gorman, San Antonio, Texas, President. Dr. W. E. Flesher, Oklahoma City, Okla., President-Elect. Dr. P. G. Spencer, Waco, Texas, Sec.-Treas. Drs. T. W. Sorrels, O. E. Busby, and T. G. Duckworth, compose the Board of Censors.

Meeting of the Board of Dental Examiners of Alabama

The Board of Dental Examiners of Alabama, will meet Monday, June 20, 1921, at 9 o'clock A. M., at the Birmingham Dental College, Avenue F and 20th Street, Birmingham, Alabama, for the purpose of examining applicants who hold diplomas from reputable dental colleges, for certificate of qualification to practice dentistry in Alabama.

All applications accompanied by the examination fee must be filed with the Secretary-Treasurer at least one week before the examination. For further information, application blanks, etc., address, H. Clay Hassell, Secretary-Treasurer, 616-22nd Ave., Tuscaloosa, Ala.

Missouri State Dental Association

The fifty-sixth annual meeting of the Missouri State Dental Association, will be held at Springfield, Missouri, April 25, 26, and 27. The meeting will take the form of an intensive postgraduate course, five distinct and separate courses being given, by prominent men, on the various subjects.

National Dental Association Meeting, August 15 to 19, 1921

Milwaukee, metropolis of Wisconsin, famed from coast to coast for its homes, health, and hospitality, as well as for the fact that it is the greatest convention city in the middle west, will act as a great reception committee and hostess to the 8000 or more delegates, visitors and guests, attending the twenty-fifth or Silver Anniversary Convention of the National Dental Association on August 15 to 19, 1921.

Milwaukee's auditorium, an ornate structure right in the heart of the city, erected at a cost of \$1,500,000 will be the scene of the great gathering of representatives of the dental profession and its allied activities.

Managements of the various hotels have already reported reservations for the convention in August, which is indicative of the fact that the entire country from coast to coast, and North to South, will have representation at the great Silver Anniversary gathering of one of the leading professions.

Milwaukee committees and officers of the National Dental Association are co-operating to make the Silver Anniversary Convention a success.

Announcement of New Plaster Plane and Measuring Instruments

Dr. Clinton C. Howard of Atlanta, Georgia, has been successful in securing the completion of his first fifty motor driven model planes, together with specially designed measuring instruments. Dr. Howard has spent a number of years in perfecting the above instruments to meet the exact requirements of the orthodontist. His efforts will be welcomed by the profession.

Items of Interest

Dr. Harle L. Parks announces the removal of his office from Harriman, Tennessee, to Atlanta, Georgia. Associated with Dr. Thos. P. Hinman, 507-15 Fourth National Bank Building. Practice limited to orthodontia.

Dr. P. R. Ashplant announces the opening of his office at 170 Grand Street, Newburgh, N. Y., for the practice of orthodontia exclusively.

Dr. Guy B. Fairchild announces his return from New York City, and the re-opening of his office, Suite 319, Northwestern National Bank Building, Grand Forks, North Dakota. Dr. Fairchild will limit his practice to orthodontia.

DR. MARTIN DEWEY, OF NEW YORK CITY
President of the American Society of Orthodontists, 1921

The International Journal of Orthodontia and Oral Surgery

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VOL. VII

ST. LOUIS, MAY, 1921

No. 5

ORIGINAL ARTICLES

THE POSITION OF THE DECIDUOUS TEETH, AN IMPORTANT DIAGNOSTIC SYMPTOM

BY E. A. BOGUE, M.D., NEW YORK, N. Y.

TODAY is the period of preventive medicine. Why should we not drop the consideration of the teeth as teeth, and look upon them as indications of conditions that exist in the animal economy and that need corrections? Conditions which, if not corrected, will lead to faulty development of the whole body, including faulty development of the permanent teeth, often including flattened sides of premolars and molars, defective enamel covering, which includes deep sulci instead of a continuous enamel surface like a coat of mail over the entire surface of the tooth or teeth affected, and a retardation of their eruption, because the arches into which they must erupt are not big enough for them to come into regularly, and they have to crowd in among a lot of teeth, themselves crowding for space that they have not.

The deciduous teeth show most clearly to him who is able to read their language the conditions that tend to this faulty development of the child, and if not corrected, lead to a body so much below par that the child is not able to fight the battles of life as it should.

The width of the normal maxillary arch of the permanent teeth in the premolar region is generally from 33 to 35 mm. in mankind. The premolars develop between and are embraced by the three roots of the maxillary deciduous molars and they erupt from the same spot, so that if the maxillary deciduous molars stand in the places that the premolars ought to occupy, these premolars will erupt exactly under them and will develop their roots there; but, if these deciduous molars are not in correct position, the premolars cannot be in correct position either, for they develop between the roots of the deciduous molars and they erupt at that spot when the deciduous molars are lost.

Now, the bearing of all this upon our subject is that if the child is in

good health, the deposition of bone (alveoli) around, among, and especially between, the deciduous teeth is such as to form an arch large enough to hold these deciduous teeth steadily in juxtaposition to each other, but not in contact, and the six anterior teeth will be far enough apart for the permanent teeth which are behind and within the circle of their roots to erupt regularly in a proper arch and the vital energy of that child will be such as to cause the deposition of bone between and around the roots of these erupting and developing permanent teeth, so as to hold them securely in the arches. This is normality.

Now let us turn to abnormality. In very many cases, probably the most of them, in civilized life, the dental arches are too narrow; they do not come up to the average as obtained from the measurements of the most ideal dentitions that we can find. This is true of both the deciduous and permanent

Fig. 1

arches. In so much, then, as the permanent row of teeth with but few exceptions, occupies exactly the same arch that is occupied by the deciduous row, if the deciduous arch is too narrow, spread it as soon as it is found to be too narrow, whether the age of the child is three or six or anywhere in between, but always the sooner the better; because the premolar region is the part of the arch that is nearest the nasal passages, which are also spread when the teeth are spread and is the part that most surely needs spreading in the majority of cases. If the deciduous teeth are still in the mouth, the roots begin to absorb about six years of age, and if the absorption has been great enough to prevent the movement of the premolar crowns in their entirety, these second teeth will either be left in their original positions, or they will be tipped or rotated instead of being moved bodily, and will require readjustment after the deciduous arch is spread. These deciduous teeth can be regarded as handles with which one can widen the nasal cavities and air passages so the child can breath naturally, and with the closure of the mouth

which follows this treatment, the child will be less liable to inhale deleterious germs that may be floating in the atmosphere. As a result of this widening of the arches and nasal cavities, we notice a better development of the thoracic cavity and a more vigorous operation of the heart as well as the lungs.

Fig. 2.

Fig. 3.

Fig. 4.

There is a periodicity of growth among our civilized children which causes a retardation from about the sixth to the twelfth year when the growth is resumed. In two or perhaps more cases I have apparently succeeded in breaking up this periodicity and the children have continued their growth

uniformly through that period for they are still growing and not yet thirteen years of age.

At the Hygiene Exhibit held in Dresden, I think in 1911, it was shown that the human brain averages at birth 371 grams, and that the brain at six years of age averaged 1360 grams, while at nineteen it weighs 1400 grams. This shows that the skull of the child of six has nearly reached its adult size;

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

and if the skull can be shown to be subnormal at that age or earlier, the inference would be that it could hardly be expected to become normal at adult age unless something was done to make it resume the growth which had been interrupted. This growth can be stimulated by one of three ways that will be mentioned later.

The early diagnosis of the lack of growth of the skull and face can be made from the deciduous teeth, and made almost at a glance. It has been stated that normality of the deciduous teeth means that the anterior teeth

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

must be separated to insure a normal position of the permanent teeth, and this spacing also denotes normal growth and lack of it indicates abnormality.

Therefore, if the deciduous teeth are found to be close together, the diagnosis is clear that the necessary life force which should accompany development and the eruption of the deciduous teeth has been lacking, and if the breadth between the maxillary deciduous molars is not more than 28 mm., it is fair to presume that some assistance must be given to procure a normal eruption of the teeth, which will in turn mean a normal cranium and face. There are three general ways which may be utilized in causing nature to resume this growth, the lack of which has been diagnosed from the deciduous teeth. First: The use of proper food and exercise. Second: A stimulation of growth by the use of thyroid or other glandular extracts. Third: A stimulation of growth through mechanical means. All of these may be employed at times.

In order to impress more fully what is meant by the normal, I shall show a normal case photographed at two and one-half years of age (Fig. 1). Models

Fig. 13.

Fig. 14.

of the case were taken at the age of six and one-half (Fig. 2) and the models of the same case are shown at ten years of age (Fig. 3).

As an example of abnormal development or rather lack of development, Fig. 4-B shows the models of the mouth of a middle-aged lady who is the mother of four children. She must have had a narrow mouth during childhood, as is shown by the models. The models in (Fig. 4-A) are from the mouth of one of her children who has a wider arch than the mother, although the child is but three years and four months old.

Other examples of the lack of development can be shown in the case illustrated by Fig. 5 which was made at five and one-half years. Fig. 6 shows the same case at eight, and there has been no lateral development. At the age of eleven, Fig. 7, we again find no lateral growth has occurred and remains .90 of an inch wide between the deciduous molars.

Another case which also shows similar lack of growth is seen in Fig. 8 which was taken at seven years of age, Fig. 9 at ten years, and Fig. 10 at thirteen. Fig. 11 and 12 also show another case in which there has been no lateral growth over a period of three years. None of these cases shows any lateral growth and the condition could have been diagnosed early and any one or all three of the methods of inducing growth could have been used with good

Fig. 15.

Fig. 16-A.

Fig. 16-B.

Fig. 16-C.

results. Of course mechanical stimulation is the one method that will be most discussed in this paper. With these three cases an early treatment should have been begun.

Fig. 13 shows models of a case at four years of age when treatment was begun. Fig. 14 shows models of the case made three years later. Fig. 15 shows the case again four years after the second model was made. Some idea of the amount of growth that has been obtained can be realized by comparing Fig. 13 with

the models shown in Fig. 15 which are photographed on the same scale. The three views in Fig. 16 show the facial development of the patient at the time the model in Fig. 13 was made. As a result of the growth which was produced by the mechanical assistance, the face has developed as you see it in the three views shown in Fig. 17. The facial outlines in Fig. 17 are associated with the models shown in Fig. 15. The front view of the patient shows a develop-

Fig. 17-A.

Fig. 17-B.

Fig. 17-C.

Fig. 18.

Fig. 19

ment of the face and cranium for which it would be hard to suggest any improvement. In fact the patient would be classed as one of normal growth.

Another case of early diagnosis and treatment is shown in Fig. 18, the models of a patient five and one-half years of age. The arches show a lack of development with no spaces between the deciduous incisors. Within one year the arches were spread as shown in Fig. 19. Fig. 20 shows the case at the age of nine years and two months, and Fig. 21 shows the condition as

found at twelve years and four months. Fig. 22 shows the occlusion of the models. It can be easily understood that the facial outline of the patient was as greatly improved as were the dental arches.

Another case which is slightly different and which was susceptible of an



Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.

Fig. 25.

Fig. 24.

early diagnosis is seen in Fig. 23. The models were made when the child was two and a half years old. In January, 1919, the teeth had taken a position whereby the maxillary molars on the left side occluded buccally to the mandibular molars, instead of striking the occlusal surface. As a result of this malocclusion of the teeth, the maxillary molars were forced outward toward the

Fig. 26.

Fig. 27

cheek, making the maxillary arch 30 mm. broad. The mandibular molars were driven toward the tongue, making a one-sided condition of the mouth. Figs. 24 and 25 show the abnormal relation of the molars. If this case is allowed to remain with the deciduous teeth in malposition, we should expect to find a similar malocclusion of the permanent teeth.

The boy shown in Fig. 26 was five years old and a mouth breather. The maxillary arch was but 28 mm. wide in the second deciduous molar region.

(Left side Fig. 27.) In ten months the maxillary arch was spread until there was 35 mm. between the second maxillary deciduous molars and a corresponding increase in width was obtained in the mandibular arch. This spreading of the molar regions caused a separation of the anterior teeth which I estimated would provide enough space for the permanent teeth. The change in the arches can be seen in Fig. 27, the models on the right being the case after

Fig. 28.

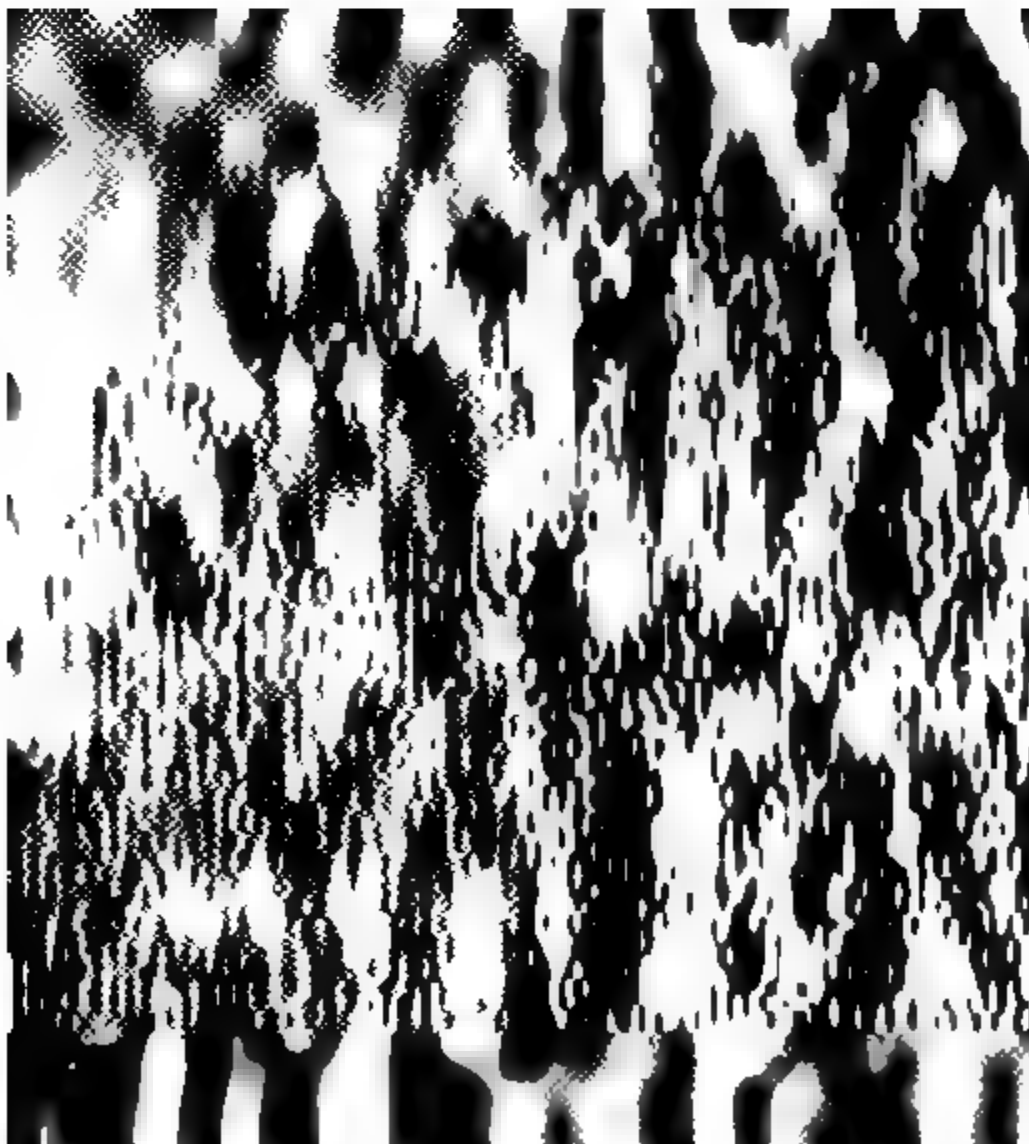


Fig. 29

expansion. Fig. 28 shows a photograph of the patient a few months after treatment. With the majority of these patients, the breathing is greatly improved by the expansion of the arches and snoring ceases.

The models shown in Fig. 29 represent a boy six years and four months of age whose maxillary arch was only 27 mm. in width. He had suffered from abscesses in his ears in the spring of 1914 and again in the spring of 1916, the ear drums being pierced at both times. Considerable deafness was present at the time of the beginning of the orthodontic treatment. An appliance was

Fig. 30.

Fig. 31.

placed on the teeth in May, 1916, for the purpose of spreading the arches. In six months the maxillary arches had been widened to 35 mm. between the second deciduous molars. This widening changed the nasal cavities and relieved the pressure on the eustachian tubes, with the result that the deafness was no longer apparent and the boy could hear the ticking of a watch five feet away with both ears. The improvement in hearing has continued up to the present time. One advantage of this early diagnosis and treatment is that by beginning the widening of the arches at five years of age, it is not necessary to attach appliances to the permanent teeth and thereby the danger of decay to the permanent teeth is wholly eliminated. Furthermore, children

who have been taught to keep the teeth clean when they are young acquire habits of cleanliness that remain through life. I have never carried through a case of correction of the deciduous teeth that was followed by decay of the permanent teeth, caused by the regulating appliance. As a rule, too rapid treatment is to be condemned but in the case reported here, I believe the rapid treatment did no harm and the later history of the case shows that the patient was greatly benefited. Figure 30 shows the portrait of a girl eight years of age. We had but twenty-four days before she was obliged to go south for

Fig. 32

Fig. 33

the winter. A gland had been removed from the neck and there had been one or two operations on the nasopharynx, and the general condition of things indicated that the patient would be greatly benefited by orthodontic treatment to widen the arches. Two screw appliances were used as shown in Fig. 31 and in twenty days we had moved the lateral halves of the arches seven millimeters. Fig. 32 shows later models of the case. The mother has lately sent me a photograph of the child made seven years later than the first one which is Fig. 33. The nasal passages have remained clear, the hearing is normal, and the general health good. Nevertheless, this case could have

been diagnosed much earlier from the position of the deciduous teeth and a normal development started at a much earlier period in life. This case however proves that by widening the arches the breathing can be greatly improved and better hearing established by the proper orthodontic treatment, even though such results are doubted by some.

That the breathing can be greatly improved by the proper orthodontic treatment is proved by the case shown in Fig. 34. The models on the left are of a boy ten years and ten months. The models are shown in occlusion and separated. The rhinologist in attendance decided that it would be impossible

Fig. 34

to move the teeth at that age and keep them in an upright position. The models on the right show the condition at seventeen years of age, seven years after treatment was begun. Since the orthodontic treatment there has been no further trouble from mouth breathing and the arches have remained in a fair position. This case like the preceding one could have been diagnosed much earlier and better results obtained by an earlier treatment.

It is my belief that most, if not all lack of developments can be diagnosed from the deciduous arches and that great benefit can be derived from early treatment. Of this I am sure from the treatment of many cases during the last twenty years.

DIRECT BAND TECHNIC AND INSTRUMENT EMPLOYED

BY PHILIP L. SALZBERG, D.D.S., BROOKLYN, N. Y.

THE plain or Magill band is a band contoured to the shape of the tooth the ends of which are soldered together. For its final adaptation to the tooth surfaces, we rely upon the accuracy of contour, elasticity of the band material, and a minimum amount of cement. It is not only used on the anterior teeth, but also on molars and premolars for anchorage, and has almost entirely replaced the ready made clamp band for that purpose, for it is the least irritating to the soft tissues.

The methods employed in making these bands vary somewhat with each operator, but can be grouped as follows:

The direct method—In which the band is constructed directly upon the tooth.

The indirect method—In which the band is constructed either on a plaster or metal model.

Most operators, however, agree that bands for the anterior teeth fit better, and can be made more expeditiously by the direct method. The reason

Fig. 1.

for this is that a proper pinch in the band material can be made with suitable pliers, because a thinner gauge metal can be used, and because the field of operation is not obstructed by cheeks and muscles.

What constitutes a correct pinch in the band material? To make a correct pinch, the band material is pulled tightly around the tooth, using a pushing force with the beaks of the pliers, and at the same time closing these beaks. These forces must be perfectly balanced to avoid injury to the tooth and surrounding tissue. Controlling these forces is often a difficult matter. To overcome this and also the difficulty of working on posterior teeth the following described instrument and technic was devised. (Fig. 1.)

The instrument consists of two beaks, the opening and closing of which is controlled by a thumbscrew, and a movable rod, working in a square tube, also controlled by a thumbscrew. The ends of the beaks are concave to con-

form to the convexity of the labial or buccal surfaces of the teeth. The movable rod has a slot anteriorly for anchoring the band material.

THE TECHNIC

A strip of band material is passed around the tooth and the approximate length is noted. To this about one and one-eighth inches more are added. The ends are then joined together by making a very small double fold with flat-nosed pliers. It is then flattened and compressed with the same pliers. The folded portion is passed through the beaks and anchored into the slot in the rod. We thus have a ready-made clamp band, inexpensive, easily made, without any soldered parts, and the additional advantage of encircling the tooth completely.

The same general technic employed in fitting the clamp band is used here. At first the thumbscrew which controls the movement of the rod is slightly tightened. This draws the band material against the tooth. It is then loosened and removed from the tooth. A gingival and occlusal constriction is made inward and the band is placed back on the tooth. This time the rod is drawn in further which draws the band material tighter against the tooth. It is then accurately burnished and secondary pinches with pliers are made if necessary. The pulling force of the rod is then sufficiently released to allow for the closing of the beaks. The beaks are then opened, band removed from the tooth and instrument, and soldered.

The advantages of this method are as follows:

Sufficient force to stretch any gauge band material over the bulge of tooth can be obtained.

The forces are perfectly balanced and under complete control of the operator.

Owing to the curvature of the beaks, a gingival and occlusal constriction is formed.

The beaks of this instrument leave a distinct mark on the metal so that either a square joint or lapped joint can be used in soldering the ends together.

The hands of the operator are at all times free to burnish or make any other changes in the band material.

IMPACTED DECIDUOUS TEETH*

BY F. M. CASTO, M.D., D.D.S., CLEVELAND, OHIO

THE subject of impacted deciduous teeth is one upon which very little has been written, and therefore has elicited but little discussion.

The cases I have to exhibit today are peculiarly all deep impaction of the maxillary second deciduous molars. Most of you, no doubt, have observed cases in which some of the deciduous teeth, usually the molars, have failed to follow the occlusal plane. Frequently this is due to the absence of the succeeding permanent teeth, or the lack of vertical development in that particular region. Occasionally these teeth become so wedged between the erupted permanent teeth on either side that extrusion is prevented even though there should be a tendency to do so. More than this, deciduous teeth so placed are sometimes intruded or forced up into their sockets by the crowns of the permanent teeth crowding over their occlusal surfaces, until

Fig. 1.

Fig. 2.

Figs. 1 and 2—These are radiograms of the case before the operation, and, as one will observe, the impacted deciduous molar is shown in close relationship with the second premolar.

they are almost buried in the jaw. These might properly be called impacted teeth but they are not of the class of cases under discussion.

Until a comparatively short time ago I had not seen a deep impacted deciduous tooth, nor had I heard the subject discussed. The first case came under the observation of Drs. Harvey and Stephan. The upper left second premolar had not erupted, and the first permanent molar had tilted forward, partially closing the space. A radiogram was made, which revealed a condition that was difficult of interpretation. However, a diagnosis of an impacted second deciduous molar was finally made, and an operation for its removal advised. It was thought that a distal movement of the first molar would facilitate the removal of the impacted tooth, so this was done. In due time an anesthetic was administered and Dr. Stephan operated. He

*Read before the Alumni Society of the Dewey School of Orthodontia, April 3, 1920.

discovered that the impacted deciduous molar and the second premolar were encysted, and that neither could be removed singly. He broke up the cyst wall, attempted to pry the teeth apart, and discontinued the operation in the hope that the teeth would separate so the deciduous teeth could be removed. After waiting several days another operation was performed, but it was found necessary to remove both teeth, not because they were encysted but on account of the peculiar relative position they occupied.

Figs. 1, 2, 3, 4, 5 illustrate this case, and I am permitted to present it through the courtesy of my friend, Dr. J. F. Stephan.

Fig. 3.

Fig. 3.—This is a photograph of the upper cast, and the two teeth removed, viz., the impacted deciduous molar and the second premolar.

Fig. 4.

Fig. 5.

Figs. 4 and 5.—These are radiograms of the case three months after the operation and show the regeneration of bone.

Of the five cases I have to present, two were comparatively easy to diagnose, while the other three were quite difficult.

The Diagnosis consists:

First: In taking a history of the case.

Second: Making models and a study of same, observing whether or not there are any missing or unerupted deciduous teeth.

Third: A careful examination of the region suspected both by observation and palpation.

Fourth: Elicit any information regarding local or systemic manifestations or disturbances such as tenderness of the teeth or bone, swelling, or

pain in the affected part, destruction of bone, or resorption of the roots of the permanent teeth, or whether there are any reflex nervous phenomena present.

Fifth: Have good clear radiograms made, and from various angles when necessary. The interpretation of these will form the basis of your diagnosis.

Causation.—The presence of supernumerary teeth, retarded development of the deciduous teeth with an early development, and eruption of the first permanent molar and a mesial movement of same, a misplaced crown, accidents, and constitutional disorders such as rachitis, tuberculosis, and syphilis.

The pathologic significance would be the formation of cysts which might involve one or more teeth, the destruction or dissolution of both the hard and soft tissue, the resorption of the roots of the adjacent teeth, infection, and formation of abscesses, the loss of permanent teeth, and the production of certain reflex nervous phenomena.

Prognosis.—Favorable from a surgical and orthodontic standpoint when the case is treated early, although the loss of permanent teeth may be expected in some cases.

Treatment.—Surgical and orthodontic. The impacted tooth should be removed and the cyst walls destroyed, after which the occlusal relation should be restored.

I shall now give a history and illustrate the cases I have to present.

CASE 1.—E. C., male, age eleven years. *History.*—Good. *Diagnosis.*—Impacted upper left second deciduous molar. *Cause.*—Misplaced crown of the deciduous molar and early development and eruption of the first permanent molar. *Pathology.*—Formation of a cyst involving the impacted deciduous tooth and second premolar. The gradual expansion of the cyst walls causing displacement of the roots of the first permanent molar and first premolar, and a dissolution of adjacent bone. *Symptoms.*—Unerupted or missing tooth, slight enlargement bucco-lingually, malposition of the first permanent molar, negative as to pain, tenderness, or systemic manifestations. *Prognosis.*—Favorable after the removal of the encysted teeth. *Treatment.*—Surgical: Both of the teeth contained within the cyst (second deciduous molar and second premolar) were removed, not because they were encysted, but because their relative positions were such that they could not be separated. Orthodontic interference was not considered necessary, and the present condition of the case bears out the logic of that decision. Figs. 1, 2, 3, 4, and 5 illustrate the case.

CASE 2.—J. T., female, age ten years. *History.*—Doubtful. *Diagnosis.*—Impacted upper right second deciduous molar, cyst formation that probably involves the second premolar, which is misplaced and lying almost horizontal in the jaw. *Causation.*—Misplaced crown of the upper right second deciduous molar. Lack of symmetrical or coordinated growth. Probably some constitutional disorder. *Pathology.*—The presence of a cyst, the expanding walls of which are causing pressure with a consequent dissolution of tissue, and producing a more or less continuous nerve strain. *Symptoms.*—Bucco-lingual enlargement, malposition, and tenderness of first permanent molar. Child in high nervous state, bordering on nervous exhaustion. *Prognosis.*—Unfavorable so far as the retention of the first and second premolars are concerned. *Treat-*

ment.—Surgical and orthodontic. This case has not been operated so the extent of a surgical operation cannot be determined. April 3, 1920.

Feb. 1, 1921. Since presenting this case it has been operated upon. A large cyst was found, into which was incorporated the impacted deciduous molar and second premolar. A considerable destruction and dissolution of tissue had

Fig. 6.

Fig. 7

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 6.—This is the first radiogram made of the case, and presents rather a difficult problem for interpretation, especially when not suspecting an impacted deciduous tooth.

Figs. 7, 8, 9, and 10.—These are radiograms made over a period of about three months, and approximately one year, subsequent to Fig. 6, and at various angles. They show conclusively the impaction of the second deciduous molar.

Figs. 11 and 12.—These are postoperative radiograms, and were taken two weeks and six weeks after, respectively. They show the progressive regeneration of bone.

occurred, and the root of the first premolar was involved to such an extent that its removal was necessary, along with the second premolar and the impacted deciduous tooth. An earlier operation was advised, and might have saved at least one of the premolars, but the parents would not submit to it until it finally became a necessity. Figs. 6, 7, 8, 9, 10, 11, and 12 illustrate this case.

Fig. 13.

Fig. 14.

Fig. 13.—This is a radiogram showing the impacted deciduous molar in such close relationship with the second premolar that it is quite difficult of interpretation. The two small supernumerary teeth are also shown lying horizontally below the impacted teeth, and are undoubtedly the cause of same.

Fig. 14.—This is the same as Fig. 13 except it was taken at a slightly different angle. (A number of radiograms were taken at different angles but these will show all that is necessary here.)

Fig. 15.

Fig. 16.

Fig. 15.—This is a photograph of the models before and after the operation.

Fig. 16.—This is a photograph showing the deciduous molar and supernumerary teeth removed.

Fig. 17.

Fig. 18.

Figs. 17 and 18.—These are radiograms taken about six weeks and three months, respectively, after the operation, and show the second premolar in position, and the progressive regeneration of bone.

CASE 3.—E. W., female, age nine years. *History.*—Good. *Diagnosis.*—Impacted upper left second deciduous molar. *Causation.*—The presence in the jaw of two supernumerary teeth, which were lying in a horizontal position below the upper left second deciduous molar, preventing its eruption. *Pathology.*—A small

cyst involving the deciduous molar, but not causing any discernible pathological condition at the time of operation. *Symptoms.*—Malrelation of the permanent first molar and a slight bucco-lingual enlargement. *Prognosis.*—Good after the removal of the supernumerary teeth, and the impacted deciduous molar. *Treatment.*—Surgical and orthodontic. The two supernumerary teeth and the impacted deciduous molar were removed and the cyst wall destroyed. The crown of the second premolar was not disturbed as will be observed in the radiogram. The operation was done by Dr. J. P. Henahan, and required about forty-five minutes. The roots of the deciduous molar were well developed and quite divergent to the crown. Figs. 13, 14, 15, 16, 17, 18 illustrate the case.

• CASE 4.—S., male, age nineteen years. *History.*—Good. *Diagnosis.*—A

Fig. 19.—These are radiograms, showing the impacted deciduous molar, although rather poorly. Unfortunately, through a misunderstanding, the case was operated before another radiogram was taken.

Fig. 20.—This is a postoperative radiogram, made in about six weeks, and shows the condition at that time

probable impaction of the upper second deciduous molar. The radiograms were not very good and the diagnosis was rather uncertain until confirmed by the operation. The patient is a freshman student at the Dental School. *Causation.*—There is but little doubt in my mind but that this impaction was due to a misplaced crown or tooth. *Pathology.*—The impacted tooth was encysted and the pressure had caused partial resorption of the mesio-buccal root of the first permanent molar, and possibly death of the pulp, also considerable dissolution of adjacent tissues. *Symptoms.*—Malrelation of the first permanent molar and second premolar, bucco-lingual enlargement, tenderness over the affected area. Also of the first permanent molar. *Prognosis.*—Good so far as the health of the tissue is concerned, after the removal of the impacted tooth, and cyst wall. *Treatment.*—Surgical. The first permanent molar was removed on account of its being

pulpless and the evident condition of the bone around the roots. The impacted deciduous tooth was then removed and the cyst wall destroyed. The operation was done by Dr. John Sweeney at the school clinic. The roots had been resorbed and nothing but the crown remained. (Figs. 19 and 20.)

CASE 5.—C. T., female, age eight years. *History*.—Good. *Diagnosis*.—Impacted upper left second deciduous molar. *Causation*.—Misplaced crown of the impacted tooth, and early development and eruption of the first permanent molar. *Pathology*.—A cyst has formed around the impacted tooth that is causing more or less disturbance, the extent of which cannot be determined without an operation. *Symptoms*.—Slight bucco-lingual enlargement. Malposition of the first

Fig. 21

Fig. 22.

Fig. 23.

Fig. 24.

Figs. 21, 22, and 23.—These are radiograms showing the impacted deciduous molar and its relation to the second premolar, and roots of the first permanent molar. These were taken at intervals over a period of six months and at different angles.

Fig. 24.—This is a postoperative radiogram made in about four months, and shows the second premolar to be in a favorable position.

molar and slight tenderness. *Prognosis*.—Doubtful as to whether the second premolar can be saved. Otherwise good after the removal of the impacted tooth. *Treatments*.—Surgical. An operation has been advised but on account of the patient being away from the city several months it has not been done, April 3, 1920.

Feb. 1, 1921. Since presenting this case, it has been operated by Dr. Hood. He found the impacted tooth encysted and some destruction of bone, but was fortunately able to remove the tooth without disturbing the second premolar, as indicated in Fig. 21. Figs. 21, 22, 23, 24 illustrate the case.

DISCUSSION

Dr. William C. Fisher, New York City.—I have discussed this particular matter with Dr. Casto before, and I think I have gone over these very cases. I differ with him in one case in which he removed the impaction, and then said orthodontic interference was not necessary because it was shown some time afterward (although it may have moved forward from the position seen in the x-ray) that the molar was tilted. I do not believe he would get proper cusp contact unless he had orthodontic assistance. I am going to show what I consider a failure which was partially caused by what I term progressive impaction, not a full impaction as Dr. Casto had, but one that was progressive. In other words, the infant molar was being pushed further and further back into its socket.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 1 shows the case as I first saw it with the tooth going back into the socket.

Fig. 2 shows the case later. This tooth can hardly be seen. It was progressing so fast that after about six months of orthodontic interference and opening that space, it still seemed to be going into the socket. There was no pressure after I had relieved it six months before, and the x-ray shows (Figs. 3 and 4) that there is no tooth above it. I then took x-ray photographs of all the teeth and found there were two second maxillary premolars missing

and one mandibular premolar. (Figs. 5 and 6). Of course, that immediately complicated my case. I only saw my case with great interruptions about five or six times during the first year; when this complication of the loss or absence of premolars was found (Fig. 7). I then could not make up my mind whether I should extract the infant molars at that particular moment and close the space or not. I could not make up my mind what I should do in the case of the fifth premolar.

Fig. 7.

Fig. 8.

Fig. 9

Fig. 10.

Fig. 11.

Fig. 12.

Shortly after that I was called into the army and suspended treatment. I shall show the terrible malocclusion that I found after one year. In other words, I have to start my case after two years and retreat it.

You will notice the tilting (Fig. 8) and the protrusion. The occlusion is very im-

perfect. I must place these molars in the proper occlusal plane and bring them forward (Fig. 9). My argument is that in these cases wherever there is impaction and loss of teeth, we must make a correct diagnosis. I did not make a correct diagnosis because I did not use the x-ray until I had had the case under treatment for nearly twelve months. If I had x-rayed my case the first time, I would have known the teeth were missing: I would have seen the impaction, which was progressing; I would have removed these teeth and closed the spaces and would have finished the case before the Kaiser ever called me away from my work.

Dr. Casto.—Do I understand that the teeth were taken out and the case discontinued?

Dr. Fisher.—I discontinued treatment because of illness of patient for several months after the extraction of these teeth. I was to continue the treatment, but was called to the army and suspended treatment for a year, and that is the result.

Dr. Casto.—Do you think you could have moved the first molars into better positions than you found them the time you extracted these teeth?

Dr. Fisher.—I think I could have done one thing which is certain; I could have benefited the case, whether I could have completed it or not, I do not know. Here is a photograph of the child taken two months ago. Fortunately I have not destroyed the fine facial lines of that child. (Figs. 11 and 12). When the child was brought to me she had trouble in occluding the jaws; the median line was off about three eighths of an inch. Of course, I have corrected that materially and I think you will see the median line there is very good. The first premolars will not occlude in the present condition.

Dr. Casto.—What is the position of the third molars?

Dr. Fisher.—The third molars are coming into place very well. They show no impaction at all.

Dr. Flesher.—In her development from now on, will there be any change in her facial condition?

Dr. Fisher.—If I close the space, the third molars will be given plenty of room. The only question to me is should I have removed in this case the odd premolar? I have five premolars. After discussing the matter with others, I thought it was all right to leave all five premolars, yet I do not think we can have any fixed rule in such cases.

Dr. Guy F. Corley, Mattoon, Illinois.—I would like to ask the essayist whether he thinks these cases are merely coincidences, whether they are supernumerary teeth, and whether he has a solution for them?

Dr. Casto (closing the discussion.)—In answer to Dr. Corley's question, will say that these cases have simply been coincidences. It has so happened that no other deep impacted cases of deciduous teeth have presented. There is no reason why impaction should be confined to these particular teeth.

With regard to the question asked by Dr. Weeks, that was answered in the first part of my paper. I stated that the cases to be presented were deep impactions and not conditions where the deciduous teeth had erupted and afterwards had been intruded into their sockets. I do not believe it possible for a deciduous tooth, after it has taken its position in the arch, to be again forced up into the process and become covered with bone and soft tissue so that it will be completely isolated in the bone. In such cases there will always be a fistula or opening between the tooth so intruded and the oral cavity.

The horizontal position of all of these impacted teeth was about at the upper third of the roots of the first permanent molars.

In regard to the first case presented, I spoke of the inadvisability of orthodontic interference at present. My conclusions were based upon the fact that the first permanent molar is moving forward in a very satisfactory manner, and I believe will continue to do so on account of the pressure constantly exerted by the second and third molars, and there isn't much doubt in my mind but that eventually it will occupy as good an occlusal position as could be accomplished by the use of an appliance.

The cases to which Dr. Fisher referred are those in which the deciduous teeth, after having taken their positions in the arch, have been forced up into their sockets, and thus become impacted, and are not similar in any way to the cases under discussion.

Strange as it may seem, I do not believe that a case of a deep impacted deciduous tooth

has ever been reported or published. The fact that such cases have not been discovered is probably due to the very limited use of the x-ray by the orthodontist. It is quite likely that with the more extensive use of the radiogram, many cases will be disclosed. I hope that many of you present will have the opportunity to report some such cases at the meeting next year.

I thank you for your indulgence and the kindly manner in which you have received my paper.

HISTORY OF ORTHODONTIA

(Continued from vol. vi, p. 726)

BY BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY

EDWARD AUGUSTUS BOGUE, M.D., D.D.S., 1838.—“The correction of irregularities of the temporary teeth for very young children is the most important work of modern dentistry. I hope to show that the best of our constructive dentistry must be done by the time the child is six years old, that such work before the age of six, facilitates the development of the child's whole body



Dr. Edward Augustus Bogue (1838).

as it cannot do at any other age; that it enables Nature to do for the child in the most advantageous manner, much that we have sought to do at a later age, and with great trouble; that such dentistry can be done easily, quickly and practically without pain; that the cooperation of the child and its parents may be

enlisted; and that the results are permanent in a degree which is not always true of the work done at a later age.

"As the years go by I feel more like saying that if the child has competent professional care up to the age of six, he can be almost guaranteed against serious oral troubles during life, and a well developed head, nose and chest, with at least satisfactory physical vigor will result. These are the greatest guarantees of health, intelligence and efficiency that can be given any human being."

Dr. Bogue was among the first to recommend and practice early treatment and correction of the deciduous set of teeth and has for over forty-five years consistently dwelt on this early phase of orthodontic treatment.

In 1889 before the *New York Odontological Society* (*Dental Cosmos*, August, 1889, pages 581 to 596) *Dr. Bogue* presented his first paper on "*A Study of the Visible Changes that Take Place During the Development of Human Teeth and Their Alveoli*." He states:—"I present for your consideration this evening a study of the visible changes which take place during the development of the permanent human teeth and their alveoli. In saying visible, I refer to those changes that any practitioner may see if he will but take casts of the mouths that come before him and carefully preserve them for a series of years. In giving attention to the changes which take place during this development, my purpose is to find out what Nature has to tell us. Nature is our best teacher. If we can get her mind as to what constitutes a perfect denture and the basis of it, we shall be prepared in any case of imperfection to unite our efforts with hers to produce a normal condition, and that with large prospects of success.

"The diagrams exhibited are intended to illustrate certain well known anatomic facts, so as to open the way to some important and practical inferences.

"The facts are:

"(1) That the jaw continues to grow from infancy to adult age.

"(2) That its elongation is mostly from the second temporary molar backward.

"(3) That its elongation depends largely upon the growth of the permanent teeth.

"(4) That the growth of the alveolus is also dependent on that of the permanent teeth.

"From these facts it will be inferred that the removal of permanent teeth will prevent the natural development of the jaw, the growth of the alveolus, and the attainment of the height of the normal bite. These inferences, I think, will be sustained by the diagrams.

"From these various facts it seems evident that the extraction of teeth during the period of their development results in preventing the normal enlargement, causing irregularity among the teeth, and shortening the bite of the jaws, diminishing thereby the height of the features, impairing their strength, and injuring their contour."

Before the *Pan-American Medical Congress*, *Bogue* discussed the *Principles*

Underlying the Regulation on the Human Teeth (Dental Cosmos, 1893, page 1222).

"In the great majority of cases, irregularities in the position of the teeth arise from the dental arch being too small. The causes which produce this diminution of size are often obscure. We say heredity; we see the roots of pulpless deciduous teeth remaining too long in their places, and deflecting the crowns of permanent teeth away from their proper positions. This deflection is generally, though not always, inward toward the center of the mouth.

"We guess that the failure to masticate properly may in some way, as yet unknown to us, produce these results, as we see them most frequently in those classes where the food is carefully prepared by cooking and made fine for eating.

"But be the causes what they may, the effects are certainly present, and the problem before us is so to correct irregularities in the position of the teeth as to produce the nearest approach to the normal arch, which will through its own perfection remain where it is put.

"It is only through obedience to the laws governing the growth and development of the child that we can hope to obtain permanence in our results.

"Allow me, in closing, to recapitulate these six laws.

"1st. The child continues to grow up to eighteen years of age, or the time for the development of the third molars.

"2d. The crowns of permanent teeth are as large in circumference at six years of age as they ever will be, and they are packed away in their alveoli with regular irregularity, the central incisors lying in front of the laterals and the cuspids almost over them.

"3d. The cuspids are the firmest and least movable of all the teeth in the mouth, so that all the other teeth incline toward them.

"4th. The lower molars incline inward, the upper molars outward.

"5th. Each class of lower teeth develops before the corresponding upper teeth, and thus guides, or ought to guide, the upper teeth into a right position.

"6th. The lower incisors normally lean forward to form an arch with the cuspids, and so support the arch of upper incisors, which, closing outside of the lower ones, are constantly drawn toward them by the action of the lips."

In the *Dental Cosmos*, page 1213 to 1239, December, 1899, we find a paper read by Bogue before the *National Dental Association*, on *Results that Follow the Extraction of Permanent Teeth.*

"For the sake of clearness I will give in the first place a list, probably not complete, of the results that follow extraction, and then will explain those results one after the other, lest there should be some to whom occasionally they might not be familiar.

"First, then, it diminishes the size of the dental arches.

"Second, it straightens some of the lines in those arches so that the arch in certain directions is scarcely perceptible. This straightening becomes very evident at times when one has tried ineffectually to place a rubber-dam in one of these straightened arches where the teeth lean forward.

"Third, it diminishes the size of the arch of the palate.

"Fourth, it shortens the bite. That is, it causes the nose and chin to approximate more than would be normal had there been no extraction.

"Fifth, it often causes separation of the upper incisor teeth.

"Sixth, it causes exposure of the gums wherever the triturating or cutting ends of the teeth are not in contact.

"Seventh, it prevents thorough mastication. First, because hard bits of food strike the gum where spaces exist, giving pain or inconvenience; second, because the occluding surfaces of the teeth do not mesh.

"Eighth, it causes undue wearing down of the cusps of the teeth.

"Ninth, it tends later on in life to fractures of the teeth at points of malocclusion.

"Tenth, it gives greater liability to the deposit of tartar.

"Eleventh, it withdraws the normal support of the teeth, each against the other, which originally constituted the arch, resulting in a weakening of the powers of mastication or crushing of hard food.

"Twelfth, it causes as surely undue crowding between the teeth that remain and touch at their grinding edges as it gives space in the places left by extraction.

"Thirteenth, it causes a rotation upon their own axes of the teeth, which lean forward after extraction so that their contact with the adjoining teeth, if contact comes, is awkward, and is conducive to undue deposits both of food and tartar.

"Fourteenth, it diminishes the needed room for the tongue, so that speech frequently becomes less distinct than it would otherwise have been; and sometimes it leaves so little room that the patient complains of being cramped in tongue movement.

"Fifteenth, finally, if the extraction has been early in life the development of the palatine arch is so much interfered with that it becomes impossible to develop first-class vocalization. Patti would never have been heard of had she lost her first permanent molars at the age of eleven or twelve.

"I am sure that if my professional brethren will study the results of extraction as I have been compelled to study them, from the failures that have resulted from extraction, their practices can certainly be made so conservative that they will never extract unless the good to be gained will surely and greatly overbalance the injury that is sure to be done."

Below are enumerated a few of the papers presented by *Bogue*:

Observations on Some Recent Cases of Orthodontia, International Dental Journal, 1902, page 869.

Some of the Causes of Irregular Teeth, with Suggestions as to Preventive Treatment or Early Cure, International Dental Journal, 1903, page 40.

The Principal Molar in Man, and its Relation to and Bearings Upon the Other Teeth, Dental Cosmos, August, 1903, page 605.

The Influence, on Development, of Arranging Irregularly Placed Teeth Into Normal Positions, International Dental Journal, 1905, page 761.

The Relations of the Dental Arches to Pathologic Affections of the Nasopharynx and Adjacent Parts, Dental Digest, 1907, page 1374.

Theories Made Facts, Journal of Allied Dental Society, 1907, page 180.

"During four or five years I have advanced the opinion that the position of the deciduous teeth affects the permanent teeth, and that therefore any irregularities in the deciduous teeth should be corrected in order to prepare the way for the permanent teeth.

"If the deciduous teeth are brought to occupy a normal position, the crowns of the underlying permanent teeth will naturally take a correct position and their roots will be formed in harmony.

"These results have been obtained by means of very simple apparatus. But they are highly instructive to those who are interested in orthodontia."

Appliance for Expanding the Dental Arch, Thereby Increasing the Size of the Nasal Passages and Superjacent Bones, Items of Interest, 1907, page 619. (American Society of Orthodontists).

Some Results From Orthodontia on the Deciduous Teeth, Journal of the American Medical Association, 1, 1908, page 267.

Some Reasons for Orthodontia on the Deciduous Teeth, With Description of an Appliance, Journal of the Allied Dental Society.

Prevention of Dental Deformities, British Dental Journal, 1911, page 1121.

Orthodontia of the Deciduous Teeth, eleven papers published in the *Dental Digest* for 1912, continued in the *Dental Digest*, 1918. These papers are also published in two pamphlets, 81 and 28 pages.

In summarizing the articles *Bogue* states:

(1) "The regulation of the temporary teeth is the most important feature in modern Orthodontia.

(2) "The prevention of dental deformities requires the retention of the deciduous teeth in their proper positions, and proper relations to each other until the permanent teeth are ready to erupt.

(3) "Adenoids are a cause of dental, nasal, facial and thoracic deformities.

(4) "Hypertrophied adenoids may be discovered at a very early age by the parents through the presence of snuffles, ear trouble, paroxysmal cough or mouth breathing. The adenoids may generally be removed during the first year of life without an anesthetic, and with very little hemorrhage or pain.

(5) "The early discovery and removal of adenoids and thorough performance of the functions of mastication and breathing are the surest preventives of irregularities among the temporary teeth. We find an intimate relation between the irregular temporary teeth and the whole category of children's diseases.

(6) "Irregularities among temporary teeth are as frequent as among permanent teeth.

(7) "The surest preventive of dental deformities, as well as of the contagious diseases, which are acquired through mouth breathing, is to spread the arches of temporary teeth, when too narrow, and to correct malpositions.

(8) "Underdeveloped dental arches are evidence of lack of vigor. Nature unaided, cannot spread them. Almost all irregularities indicate an arrest in the general development of the child. Protrusion of the front teeth indicates a narrowed arch which is another symptom of arrest in development.

(9) "Spreading the arches of temporary teeth enlarges the nasal passages and allows the mouth to close, thus preventing the entrance directly into the lung of the air-borne microbes of contagious diseases, and forcing them to pass through the filter of the nose.

(10) "The relation existing between the temporary incisors and the permanent ones can, by measuring the width of the upper temporary incisors, be ascertained with sufficient accuracy to furnish a working basis for the calculation of the size of the permanent arches.

(11) "A standard relation between the width of the permanent upper central incisors and the proper width of the dental arches has been demonstrated, so that one may be calculated from the other.

(12) "The correction of dental deformities before the sixth year, not only assures fairly correct arches of permanent teeth, but aids in correction of nasal stenosis, due to deflections of the septum, or to too narrow nasal space and aids in the correction of curvatures of the spine, which carry with them the ribs, an irregular breastbone, and stooping shoulders.

(13) "The child's brain at six years of age is within 40 grs. of its weight at nineteen years of age; hence it is most important that all irregularities of the nose, face or teeth should be corrected before the sixth year while growth is at its maximum.

(14) "Perfectly close and regular teeth after five years of age constitute a marked deformity, and are an absolutely sure indication of a crowded condition in the permanent teeth beneath.

(15) "The normal arch of temporary teeth at five and a half years of age, its front teeth being spread apart normally, should correspond in size to the arch of the ten front teeth of the permanent set at the date of their eruption.

(16) "The conditions which most call for the attention of the orthodontists at this early age (4 to 6 years) are two; prognathism of the lower arch and the continuance too close together of the temporary teeth, especially the six front ones, up to this age. At four years of age these arches can generally be spread at small expenditure of time or money, and without pain if the child has been well brought up and has not been frightened. At five years of age it may take months to accomplish the same result, and at six years of age one can never be sure of results under two years, although the actual movement may have been made in two months. A retainer is necessary in all cases until the temporary teeth fall out.

(17) "Narrow arches of teeth are an indication of lack of vigor. If they are less than 28 mms. broad at lingual gum margins of second temporary molars at five years of age, it is wise to assume that they will not broaden without assistance.

"We of course must take the cases as we find them. Preliminary to any operation, we should determine what has caused the defects that we are undertaking to correct. There may be defects in enamel, defects in structure, shape or contour of the teeth, or defects in their position or relations to each other.

"From 75 per cent to 95 per cent of the dental arches are narrowed by some systemic weakness. This same weakness is indicated by the flattening of

the proximal sides of the bicuspid and molars, thus diminishing the possibility of self-cleansing. The same weakness has prevented a perfect union of the enamel coatings of the teeth.

"The defective spots should be filled before appliances are fitted; if there are approximal cavities, insert fillings and contour them, to make their contact points rounded.

"Regulate misplaced teeth until the lines of occlusion of upper teeth with lower ones are normal, both on grinding and approximal surfaces, and teach proper mastication to insure self-cleansing to a physiologic degree. Teach also what food to eat and what to avoid. Teach deep breathing and correct enunciation.

"While we specialize as orthodontists, let us not fall short in seeing to it, that all can be done, is done, toward putting our patient in good order to enjoy, yes, enjoy good health, for more than three score years and ten, and so justify the confidence that has been reposed in us in placing the patient in our hands.

"Finally, see the end from the beginning. Have a clear idea of the steps to be taken to accomplish that end. I do not mean that no changes should be made as changing circumstances or accidents demand, but that the main course of procedure shall be mapped out beforehand. Let us have a definite reason leading from cause to effect every time.

"Remove the cause," is one of the axioms of the healing art, and orthodontia of the deciduous teeth is treating causes; it is the recognition of conditions causing malposed permanent teeth and underdeveloped jaws; and the correction of those conditions prevents irregularities of permanent teeth with their attendant evils.

"The time and annoyance saved, not to mention the benefit of the health and development of the little patient, whose deciduous teeth were used as the means to procure the space necessary for the permanent teeth, is hard to estimate, but is considerable, as any one interested in the normal development of the child will realize."

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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CASES FROM PRACTICE

BY DR. ARTHUR ZENTLER AND DR. SAMUEL HEMLEY

Vanderbilt Clinic, Columbia University, New York City

CASE I

MISS C. C., age thirty, noticed the growth three or four years ago. It then became larger until it covered the cutting edges of the mandibular central incisors. She went to a dentist who operated and removed the growth, Nov. 19, 1919, without removing any of its base. The growth recurred and grew a great deal faster, this time involving five teeth (Fig. 1).

Fig. 1.—Anterior view of epulis covering the labial surface of the lower incisors.

The tumor, including the four mandibular incisors and the right canine, was removed on April 27, 1920, following the technic described below. The wound was packed with iodoform gauze and was dressed for three subsequent visits at intervals of forty-eight hours. Within about six weeks' time the area was in a receptive condition for a removable prosthetic appliance (Fig. 3).

The following is the pathologic report of this case. "A section of the specimen shows a bit of mucous membrane beneath which the connective tissue is dense and is arranged in irregular bundles. In some places the epithelial pegs extend down between the papillæ for an unusual distance. The cells appear regular and the basement membrane is everywhere intact. The connective tissue is markedly infiltrated with round cells which are gathered together in great cords in the tissue spaces."

Fig. 2.—Lateral view of epulis shown in Fig. 1

Fig. 3.—Photograph of patient shown in Fig. 1, after operation.

CASE II

Miss S. S., age nineteen, noticed the tumor four years ago. She refused to have any teeth extracted and finally found a dentist who removed only the soft tissues, leaving the teeth in position. It recurred and a similar operation was done two years ago. At first it covered only one tooth, the second time it covered two teeth. It recurred again, this time involving three teeth (Fig. 4).

At this stage the patient reported to us and the tumor, including its seat and the three teeth involved, was removed. The wound was packed with iodo-

form gauze for one week, the dressing being changed every forty-eight hours and then nothing but antiseptic mouth washes was used. Within a very short time the wound assumed a normal, healthy appearance (Fig. 5).

The following is the report of the microscopic examination of the specimen taken from the epulis in this case. "A section of the tumor mass shows that its central portion is made up of thick trabeculae of bone from which there project toward the surface slender trabeculae of newly formed bone which merge by insensible gradations into the overlying fibrous tissue. The surface of the growth seems denuded of epithelium throughout most of its extent.

Fig. 4.—Epulis involving the two lower centrals and the lower left lateral incisor teeth.

Fig. 5 —Photograph three weeks after operation.

"It is somewhat difficult to judge whether the proliferation of bone and connective tissue is the result of simple chronic inflammation in which case it could be likened to an exostosis or whether it is a true neoplasm, inasmuch as the mass was a pedunculated swelling, it seems more probable that it is a true neoplasm."

It has often been shown by well-known authorities on the subject that certain epulides, after a slow growth for a long time, will suddenly begin to grow rapidly and assume a malignant character; that trauma to a pre-existing epulis which has been almost stationary may cause it to grow rapidly; epulis, which has remained apparently quiescent, may begin to grow rapidly

during pregnancy; recurrences of epulis are likely to occur during pregnancy and grow less rapidly after confinement; that an epulis that has not been completely removed will recur, is usually more extensive and assumes a more malignant character with each recurrence, as can be seen from the histories of Case I and Case II.

From the foregoing facts, it is quite evident that an early and complete removal of the growth is important. The technic described is the one used in the treatment of Case I and Case II and will invariably remove all traces of the epulis and prevent recurrences.

With a Williger knife an incision is made completely encircling the growth and passing well into healthy tissue. The incision should pass through the mucosa, submucosa, and periosteum down to the bone, thus with the one incision cutting off all the blood supply to the tumor and diminishing the possibility of metastasis. When the growth involves both sides of the alveolar process, a similar incision should be made on the lingual or palatal side. With a chisel and mallet, or with a circular saw driven by a surgical engine, the alveolar process is resected; and the entire tumor with its seat is then removed *in toto*, the soft tissues and alveolar process containing the teeth involved. It is very unwise to leave a doubtful tooth and it is good practice to rather sacrifice an additional tooth than to run the risk of a recurrence. Care must be exercised to see that all traces of the peridental membrane in the periapical spaces are removed because epulis has its origin either from the peridental membrane or the alveolar periosteum. It is advisable after the complete removal of the mass to use the actual cautery. The case is then packed several times at intervals of forty-eight hours with iodoform gauze to stimulate granulation. Within a comparatively short time, the wound assumes a healthy appearance. It is necessary to watch the case for a few months before a prosthetic appliance is inserted to be sure that there is no sign of a recurrence.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

THE IMPORTANCE OF THE ELECTRIC TEST FOR PULP VITALITY AS AN AID IN DENTAL DIAGNOSIS

BY HOWARD R. RAPER, D.D.S., INDIANAPOLIS, IND.

*Formerly Professor of Radiodontia, Materia Medica and Operative Technic, and Junior Dean,
Indiana Dental College*

THERE is a great difference between simply knowing a thing and knowing it as well as it should be known.

Many years ago we knew that the x-rays were a valuable aid in dental diagnosis, but we did not know it well enough until recently.

We have known for a very long time that dental abscesses cause destruction of bone, but we have not known it well enough until the last few years.

We knew we did not fill pulp canals to the end but we did not know it well enough before the radiograph came into popular use.

Likewise, the dental profession knows now and has known for some time, that the electric test for pulp vitality is a valuable aid in dental diagnosis, but we do not know this well enough as yet.

It is the purpose of the following discourse to help to bring about a fuller and truer appreciation of the importance and value of the electric test for pulp vitality in the practice of dentistry.

In the limited space here available I can report only a few cases, but I want you to realize that in practice there are thousands upon thousands of cases where the use of the electric test is indicated and where the accuracy of the diagnosis depends upon it. Time on end it is absolutely necessary to the correct interpretation of dental radiographs. As a diagnostic measure, it is second in importance only to the radiograph.

Fig. 1. Failure of the lower first bicuspid to respond normally to the electric test directed attention to the tooth. The radiograph shows evidence of a large abscess cavity. There were no local symptoms or signs at all. Had

the electric test not been used a radiograph would not have been made of this tooth and the area of infection would not have been found. On the enamel of the lower first bicuspid the electric test was definitely negative. On the metal of the occlusal filling it was very faintly positive. Normally it would have been positive (+) on enamel and positive very strong (+VS) on the metal filling. Hence I have said that the tooth did not respond *normally* to the test, even though a faint positive was obtained on the simple occlusal filling.

Fig. 2. If one were making a casual examination of the mouth to determine which teeth were "suspicious" and should therefore be radiographed, it is unlikely that the little filling in the upper lateral incisor would arouse suspicion of a dead pulp. But when the electric test is used and the lateral fails to respond, suspicion is aroused. The radiograph shows the lateral incisor abscessed.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 3. History of this case when it presented was that "an abscessed lower lateral incisor has been extracted a month previously. Pus still discharging from the socket of the extracted tooth". The electric test was applied to the central incisor and cuspid approximating the socket of the extracted tooth. The central incisor responded positive (+) the cuspid negative (-). Thus a diagnosis was made readily enough, before the radiograph was made. The radiograph verifies the diagnosis, showing the fistulous tract of

the abscess arising at the apex of the cuspid and passing over into the socket of the extracted lateral incisor.

Fig. 4. Three blind abscesses at the apices of the upper incisors. The fact that the pulps were dead in these teeth could have been established by the use of the electric test. The radiograph was necessary to show the amount of bone destruction. The teeth have artificial enamel fillings in them. I am told that the *first* silicious cements placed on the market contained some ingredient which devitalized pulps. I cannot vouch for the truth of this. Absolutely all I know about the matter is this: I have found a sufficient number

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

of dead pulps in teeth, with artificial enamel in them so that I am particularly careful to test such teeth for pulp vitality. More of this material is being used all the time but I do not notice any increase in pulp death in teeth filled with it, which would seem to indicate that the silicious cements now in use do not contain a pulp devitalizing ingredient. (Radiograph by Alger of Los Angeles.)

Figs. 5 and 6. These two radiographs illustrate the necessity of checking up x-ray findings. In Fig. 5 the abscess arising from the lower cuspid seems to involve the adjoining lateral incisor and perhaps the central incisor also. But the electric test for pulp vitality indicates that the pulps in the incisors are vital and therefore not involved in the abscess.

In Fig. 6 the central incisor looks as though it *might* be involved in the abscess of the lateral incisor though its appearance is no more suspicious than the lower incisors, particularly the lateral, in Fig. 5. The fact that the upper central is negative to the electric test while the lower incisors are positive, is what tells us that the upper incisor is abscessed and that the lower incisors are not.

Fig. 7. We have seen the necessity of checking up x-ray findings with the electric test. Now let me illustrate the necessity of checking up pulp test findings with radiographs. The upper cuspid was quite definitely negative to the strongest current. The radiograph shows the reason for it; the pulp has receded away above the gum line throwing up secondary dentin as it

Fig. 8.

Fig. 9.

Fig. 10.

withdraws. The pulp is vital but the current could not penetrate the secondary dentin to the pulp.

Figs. 8, 9 and 10. Figs. 8 and 9 were made at the same sitting. They show the apex and periapical tissues of the upper lateral incisor at widely different angles. Neither of them show any bone change which might be taken as evidence of a septic pulp in the lateral. The lateral did not respond to the electric test for pulp vitality though, and the operator, who referred the case, was advised to make a diagnostic opening into the lateral incisor. The operator pinned his faith in the appearance of radiographs and did not make a diagnostic opening.

Fig. 10 was made seven months later. We now see quite definite bone destruction above the apex of the lateral incisor.

Figs. 11, 12, and 13. These three illustrations have been made experimentally from a skull. Fig. 11 does not show the apical bone destruction, while Figs. 12 and 13, made at different angles, do. Suppose we should have a radiograph of a tooth like the second bicuspid in Fig. 11. There would be nothing in such a radiograph to warn us sufficiently of the necessity of making the radiograph over at different angles, *unless* we had records of the application of the electric test.

Fig. 14. The small radiolucent spot at the apex of the root of the second bicuspid might be looked upon as evidence of infection if it were not for the fact that this tooth has a vital pulp, which fact has been established by its very definitely positive (+s) response to the electric test for pulp vitality.

Fig. 11

Fig. 12

Fig. 13

Fig. 14.

Fig. 15.

A gold shell crown has been removed to test this tooth, a procedure which is not infrequently indicated.

Fig. 15. The radiolucent area at the apex of the cuspid gives the tooth the appearance of being abscessed, but it is not. It responds positively to the electric test. The abscess arises from the lingual root of the first bicuspid, the crowned tooth.

Figs. 16 and 17 are different views of the same case. Both the lateral incisor and the first bicuspid are involved in a very large abscess. And, certainly, the cuspid has the radiographic appearance of being involved also—but it is

not. It responded (+) to the electric test. Subsequent history proved correctness of diagnosis.

It will probably not show in the halftone, but, in the negative, a radiolucent line (the usual line indicating the pericemental membrane) could be seen following the cuspid root. The presence of this line could not be considered proof of the vitality of the tooth, but it was contributory evidence of vitality. Not even the presence of both the radiolucent line, indicating the pericemental membrane, and the radiopaque line, indicating the lamina dura (i. e., the dense layer of bone lining tooth sockets) proves the pulp of the tooth vital and the tooth not abscessed. (See Fig. 11.)

Fig. 18 shows the mental foramen at the apex of the first bicuspid. This is a little farther forward than one ordinarily finds the foramen and so the

Fig. 16.

Fig. 17.

Fig. 18.

test is particularly needed to make sure that the pulp in the first bicuspid is vital.

Fig. 19. When in doubt, it is sometimes expedient to make an extra-oral radiograph to assist in differentiation between an abscess and the mental foramen. If a spot is seen at the apex of one of the bicuspid teeth and the mental foramen can be seen elsewhere, then the spot at the apex of the tooth must be an abscess—or a large cancellous spot in the bone. One can get a fair idea as to whether it is a large cancellous spot or not, by the general appearance of the bone, a considerable area of which can be seen in an extra-oral radiograph. In this illustration the mental foramen is at the apex of the second bicuspid.

Fig. 20. The abscess illustrated here is larger than an antrum. Obviously the first bicuspid is pulpless, for we see canal filling in the canals. The roots of the cuspid and second bicuspid seem to have their apices absorbed. These

teeth gave a negative (-) reaction to the electric test for pulp vitality. After extraction it could be seen that these root ends had been destroyed just as they appear to be in the radiograph. The crown was removed from the lateral incisor and the electric test applied. It was negative (-). This tooth also was involved in the abscess. The central incisor, which does not show in the

Fig. 19.

Fig. 20

Fig. 21.

negative, also was involved as seen in another negative, not reproduced here.

The electric test is of extreme value in checking up such unusual findings as these.

Fig. 21. How many teeth are involved in the abscess illustrated here? Frankly I cannot tell. I am reasonably sure that the central incisor, with

the canal filling, is involved because I know it is pulpless and because its apex is about in the mesio-distal center of the diseased area. But are the two approximating teeth involved? That is the question. And, in the absence of electric test records, I cannot answer it.

Fig. 22. Symptoms those of semiacute dentoalveolar abscess with sinus discharging pus in apical region between central and lateral incisors. The radiograph shows bone destruction along the sides of the roots between the central and lateral incisors near the apices but without definitely involving the apices. Response to electric test a definite positive (+). Conclusion: One of those comparatively rare cases of "pyorrhea" where, instead of the pus discharging about the neck of the tooth it discharges like a dentoalveolar abscess through the external alveolar plate.

Fig. 22.

Fig. 23

The treatment indicated for pyorrhea is vastly different from that indicated for a dentoalveolar abscess, hence the necessity of correct diagnosis. This case was treated in accord with the diagnosis given above and yielded to the treatment.

Fig. 23. There is a radiolucent spot at the bifurcation of the roots of the lower first molar. The tooth is negative (-) to the electric test. The tooth is abscessed, though there is no radiographic evidence of it at the apices of the roots. The dark area at the bifurcation is caused by a perforation of external alveolar plate, i. e., a hole in the external alveolar plate. This perforation of the external plate of bone on a level with the bifurcation of the roots is due to the thickness of the oblique ridges. If, my reader, you are inclined to incredulity, let me say I have a dry specimen closely analogous to Fig. 23.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Some Cases of Malocclusion Corrected by the Ribbon Arch. R. Tarasido.
Boletin Dental, Buenos Aires, 1920, i, No. 11, p. 26.

Three different cases of anomalies, corresponding to the first, second, and third class of typical dental malocclusions, were selected by the author for the practical demonstration of the efficiency of this apparatus, its correct application, and the excellence of its mechanism, by means of which the desired action is exerted, without loss of energy, in the most suitable direction, without impairing the physiologic function of the tissue-cells. The apparatus is eminently useful for the majority of deviations of the teeth and malformations of the jaws, such as imperfect development, prognathism, and so forth. Special attention is invited to the fact that the success obtained in these cases was secured without resorting to extractions or mutilations, which have seemed unnecessary to the author in all cases so far treated by him with the ribbon arch system.

Maxillary Sinusitis of Traumatic Origin. A. Garcia. Revista Dental, 1920, xii, No. 9, p. 273.

The author's first observation concerned a boy of thirteen years who went to sleep in the barn near a pile of wheat and received a shower of grains in his face, where they penetrated into the mouth and nostrils. Most of them he got rid of by bending over, but two grains seemed to persist in the right nasal fossa and he tried in vain to dislodge them by various injudicious manipulations, including injection of water and introduction of a small stick. Next day a quack practitioner added insult to injury, by trying to extract the grains with toothed forceps, without the assistance of a frontal mirror or nasal speculum. Instead of the wheat, shreds of detached mucosa were brought out, followed by hemorrhage, which subsided after three days, and pain which failed to disappear entirely. The patient was not seen by the author until about half a year later, when he was suffering from frontal headache and profuse suppuration from the right nostril, the pus finally escaping from the mouth after some months of alternate aggravation and improvement. Examination of the affected nasal fossa showed it to be full of polyps bathed in

thick greenish pus, preventing inspection of the walls; the polyps protruded through the choanæ and were shown by posterior rhinoscopy to occupy the cavum; the right maxillary and frontal sinuses appeared dark on diaphanoscopy. Removal of fourteen polyps of ordinary size was followed by immediate improvement of the distressing symptoms and reestablishment of nasal respiration. The patient refused further operative treatment which was urgently recommended. When seen again thirteen months later, he had been suffering for about half a year from a return of the old disturbances in the form of severe persistent headache, frequent rise of temperature, complete obstruction of the nasal fossa and profuse purulent discharge. On inspection, the nasal fossa appeared again full of polyps, which were removed, with resection of the inferior turbinate and scraping of the mucosa. Eight days later, the maxillary sinus was opened by the buccal route and treated, following the customary technic; the antrum was found to be full of vegetations and pus. The patient made an excellent recovery and was free from all disturbances at the time of the report.

Another observation concerned a woman suffering from a not very profuse but persistent nasal suppuration of prolonged standing. She gave a history of much trouble with her molars and had been repeatedly under the treatment of a dentist who had filled several molars and extracted some others. After the first molar had been extracted on account of the severe toothache caused by it, the gums a few days later became tender and the gingivitis gradually progressed, so that the dentist found it necessary to extract several other teeth. The right upper gums healed, but the left remained congested and were painful precisely at the point where the first molar had been extracted, a small fistula could here be seen from which pus was easily made to exude even with the tongue. The patient when seen by the author had only the right canine and the second left molar tooth. Puncture of the maxillary sinus and irrigation with a solution of bichloride of mercury cured the nasal suppuration, and the fistula of the gums disappeared after extraction of the molar and removal of a small sequestrum which dated from the first extraction and was the cause of the sinus inflammation. Its immediate removal would have guarded not only against the sinusitis but also against the loss of all the upper teeth.

Treatment of Complicated Cleft Palate. J. B. Roberts. *Pennsylvania Medical Journal*, 1920, xxiv, No. 2, p. 64.

Early operative treatment of congenital clefts of the oronasal partition, within the first two months of life, is advocated by the author who points out that the osteoplastic restoration of the alveolar arch may be carried out with little hemorrhage and little shock, and without a long etherization. Division of the bone on one or both sides of the fissure is frequently required, so that the two sides of the cleft can be forced together and wired in proper relation to each other. This is advantageously accomplished during the first month of life. After the ends of the wire have been twisted, the lip may be pared and sutured, if the condition of the patient permits; otherwise, the harelip should

be given surgical correction about two weeks after the osteoplastic operation on the alveolus. The wire is left undisturbed in the maxilla for four to five months. The sutures of silkworm gut are taken out about ten to fourteen days after the reconstruction of the lip, on which no dressing is used. In bilateral clefts with protrusion of the intermaxilla, this bony segment has to be forced back into its proper site, but is never removed, being an important part of the oral architecture. It is frequently impossible to shove it into a proper relation with the lateral parts of the alveolus, unless a V-shaped piece of the vomer and cartilaginous nasal septum is cut out by the surgeon, which can sometimes be done as a submucous operation. A saw is sometimes used by the author to cut through the base of the projection, in order to obtain a nearly normal reconstruction of the incisor region of the alveolar arch. When the intermaxilla has been finally replaced, the edges of the vomer may or may not be sutured with chromicized gut. The two sides of the intermaxilla are wired to the abutting ends of the lateral portions of the alveolus. He does not freshen the ends before drawing them into contact or nearly into contact with each other.

In complicated oral fissures, it is usually wise to delay the uranoplasty proper until the age of eight or ten months, at which time the author undertakes the closure of the cleft in the bony palate (uranoplasty). The soft palate is closed, or not, at the same operation, according to the width of the fissure through the entire palate structures and the anticipated difficulties of suture without undue tension. His chief desire is to secure closure of the bony fissure, even if the cleft in the velum must be left for subsequent operation, in the child's second or third year. When partial closure only has been obtained in complicated cleft palates, successive attempts are to be made; the author usually waits five or six months between operations on the roof of the mouth, but makes every reasonable effort to close the whole gap for nostril, lip and alveolus to uvula, before the child is three or four years old. He prefers to use silkworm gut for the important stitches and introduces all at a fairly distant point from the margins of the cleft in both soft and hard parts of the palate. Tension on the sutures must be carefully guarded against, in order to prevent the separation of all or a part of the suture line.

Removal of Foreign Bodies from Maxillo-Facial Areas. J. D. Eby and W. Reed. *The Journal of the National Dental Association*, October, 1920, p. 847.

The authors emphasize the difficulties attending the removal of war projectiles or their fragments from the region of the jaw and face, especially in the case of healed wounds. Immediate removal of foreign bodies from fresh wounds is much simpler, as the open tract assists localization and the object can be more easily grasped and extracted, either through its path of entrance or by way of a shorter artificial tract. Injuries of important adjacent structures in the form of nerves, vessels and muscles, with their dangerous sequelæ, can only be avoided through absolute mastery of the entire regional

anatomy. The successful location of foreign bodies usually results from the combined efforts of a careful physical examination of the patient, the detection of its location by sensation or nerve phenomena, and by the use of the x-ray. There are three advantageous methods of x-ray examination: (a) Location by simple radiograms focused at cross measurements. (b) Location by stereoscopic radiograms. (c) Localization with the use of fluoroscopy. The final and accurate means of localization usually involve the employment of the fluoroscope by one of two satisfactory methods of procedure, the selection being governed largely by the equipment and surroundings as well as the gravity of the impending operation. In the majority of fresh contaminated wounds, with more or less superficially situated missiles, the field can be injected with a local anesthetic and the foreign body can be dissected out through an incision, while in constant view under the fluoroscope. The risk of infection through surgical manipulations under the fluoroscope is too serious to permit the employment of this method in healed wounds unless proper equipment is available, which is rarely the case. By placing the patient beneath the fluoroscope and using an indelible marker, a spot can be made on the surface immediately over the object with the head placed in an exact antero-posterior position, then by placing the head in an accurate lateral position, another spot can be made with an indelible marker and sufficient other locative points can be determined from the overlying anatomy, and the patient taken to the operating room where proper preparation is waiting. After anesthetizing, an instrument such as a long needle may be thrust in the correct line through the spots and their point of convergence will usually strike the object, and it can be very readily detected by tactile sensation. As a rule, every effort should be made to extract the missile intraorally by incising the mucosa and establishing a tract leading to the missile by means of blunt dissection. Infection can be controlled by proper postoperative treatment as follows: After the removal of the missile, which is usually grasped with a hemostat, the tract should be packed with a trailer of rubber tissue permitting irrigation for several days with normal saline, thus inducing healing from within outward. Favorable results were obtained by these means in the U. S. Army General Hospital, Washington, D. C.

The Roentgen Ray in the Diagnosis of Sinus Disease. S. B. Chase. *Journal of Iowa State Medical Society*, 1920, x, No. 12, p. 404.

In the x-ray examination of the sinuses, several positions of the patient and tube are used, depending upon which sinuses are suspected. The two positions most commonly used are the postero-anterior and the lateral, the latter of which is sometimes stereoscoped. By the postero-anterior position commonly used in routine examination it is possible to show the frontal and maxillary sinuses, the anterior and posterior ethmoidal cells on the same plate without obscuring the antrum outline by shadows of the petrous portion of the temporal bone. The lateral view, in which the patient is placed on his side, the central ray passing through the middle of his zygomatic arch, is taken mainly to ascertain the depth of the frontal sinus, sella, etc. The sinuses are not shown in detail in this position. The sphenoidal sinus is

the most difficult to get and the least satisfactory where the diagnosis of pathology is concerned. The author describes two customary positions for this sinus, besides several additional positions for the ethmoids, maxillary antrums, and frontals. It is noteworthy that prolonged soft rays are liable to cause alopecia, or dermatitis; while a hard penetrating ray tends to give lack of definition. If a fast plate is used with intensifying screens, a soft ray may be used over a short space of time with good definition. A soft ray may be used for a longer time with proper filters. Very good success was obtained at Fort Dodge, in moderately thick skulls, by using Eastman duplitzed films with intensifying screens, and a soft ray from four to five seconds. The technic for each position should be as exact as possible, the current steady, with a transformer especially for the machine so that all pictures may be taken as uniformly as possible. A reasonable amount of care and skill should get good pictures. In the interpretation of the plate, the history, symptoms, and clinical finding should be taken into consideration. In certain conditions, the diagnosis of the existing disease may be made by the x-ray alone.

The Value of Skiagrams in Dentistry. T. H. Gibbs. *The Dental Record*, 1920, xi, No. 12. p. 711.

The author cautions against exaggerated and uncalled for employment of dental skiagraphy which he says is in danger of being grossly abused and will soon be discredited, unless saner views prevail. It is not necessary to get skiagrams of every tooth in every patient, or to take them several times over in the course of treatment, excepting in rare cases. At the same time the dentist should never hesitate to invoke the aid of the skiagram in cases where it would be likely to give him useful information that he could not otherwise obtain, and he should remember that even negative evidence is often of great value. For instance in everyday practice skiagrams should be obtained in a very large proportion of orthodontic cases; in delayed eruption of the permanent teeth; in cases of unusual swellings; in many, but by no means all cases of dentoalveolar abscess; often when a tooth has been fractured; the most emphatically in all cases of obscure pain and neuralgia. Skiagrams are also valuable in investigating specimens and tumors which it is desired to keep intact.

With special reference to the reproduction of bone in cured cases of apical abscess, the author points out the difficulty of deciding upon the basis of the skiagraphic findings whether a rarefied apical area is due to an active abscess or to one that has been cured. This point can probably be settled by getting a skiagram of the part before beginning the treatment of a tooth with a dead pulp or abscess. The pulp canal and abscess can then be treated, and if the treatment seems to have been a success, the tooth may be filled. A year afterwards at latest the part should be skiagraphed again from exactly the same position and the two skiagrams compared. If there is distinct evidence of new bone formation, the abscess may be considered as cured and the tooth as no longer a menace to the patient.

The Practical Significance of Dental Radiography. O. Weski. *Zahnaerztliche Rundschau*, July 27, 1920, xxix, 39.

Dental radiography seems primarily indicated in the diagnosis of fractured roots, broken drills, etc, retained teeth and especially granulomata. Next to the location of projectile bullets there is nothing so important; nothing moreover is more simple than to x-ray the teeth. Let us suppose that three patients with different affections consult the dentist for toothache. One has deep caries and pulpitis, but the examination reveals further cavities; another presents, along with an aching tooth, necrosis of the pulp; while a third has a fistula above a molar. In the first case the pulp is cauterized and this and the other cavities filled. In the second case the pulp cavity must be disinfected, etc. In the third patient the x-ray must be used, and the damage corrected. But the public is entitled to more benefit from radiography and it is impossible to care for the teeth of a subject year in and out without systematic radiography. Much about the teeth is not apparent to the dentist's vision. The dentist in the interest of prophylaxis must x-ray the teeth in the detection of caries. Cases are cited where the rays showed the presence of cavities which escaped observation by the usual means. In persistent neuralgias this is liable to occur. Approximal surfaces in closely apposed teeth, especially in incipient caries, are often beyond ordinary resources, but systematic raying will bring these hidden foci to light. Next to early caries the status of the interdental septum may often be appreciated by the rays in connection with pyorrhea and other conditions. A third field is the detection of periapical foci, while x-ray control is useful at times when treating roots.

Some Cases of Hare-lip and Palatine Fissure. Vignard. *Revue Belge de Stomatologie*, 1920, xviii, No. 5, p. 242.

In the course of eight months preceding this report, the author had occasion to operate upon a fairly large number of cases of hare-lip and clefts of the alveolar border of the palatine vault or the velum of the palate. The simplest cases are those in which there is only a solution of continuity of the upper lip. The operation for this deformity is not serious and can be performed on very young children, as soon as two to three weeks after birth. The restoration here is usually easy and satisfactory, but becomes rather more difficult and complicated when the cleft extends into the interior of the nostril and involves the cheek. Although the repair of the nostril is associated with a greater loss of blood and time than simple repair of the lip, it can be carried out in children between four and six months of age. The author has successfully performed it in a little girl one month of age, but it is preferable to operate a few months later. The same remark applies to cases of double hare-lip, especially when complete. These cases may moreover be complicated by a cleft involving only the alveolar border or extending backwards on the bony roof and the velum of the palate, which are divided in their entire length. Sometimes, there exists merely a gap, an actual loss of substance, so that one can look through the mouth into the nasal fossæ, where the free border

of the vomer in certain cases partly closes the gap. The separation of the alveolar border may be limited to a simple gap, but in other cases there is a real loss of substance, further aggravated by the failure of the two borders of this gap to correspond exactly and by their position in different planes, one lying anteriorly to the other, with the result that the repair of the upper lip itself becomes more difficult. When there is too much disparity between the two borders of the gap, the junction must be accomplished by mobilizing the incisor bone and replacing it in a suitable position. This bony intervention requires a certain power of resistance and strength on the part of the child, who must have reached the end of the first year before it is attempted. The lip should not be touched before this time, so as not to add to the difficulty of the operation. This mobilization of the incisor tubercle is still more indicated and should be performed at the same age, when as is often the case in double complete and complicated hare-lip, the incisor tubercle is found lying by itself in the middle of the gap. It should never be excised, but after a wedge-shape resection of the septum, the bone should be replaced and sutured if possible to the two borders of the gap.

The repair of the palatine vault constitutes a longer, bloodier, more difficult, and more serious intervention, which should be postponed until the age of at least four, sometimes five or six years. When performed in two sessions, at a week's interval, according to the author's technic, each operation requiring not more than twelve minutes, plastic work upon the palate does not involve much traumatism and may probably be done earlier, at the age of about three or four years, which is advantageous from the viewpoint of ulterior phonetic education of these children.

Cleft Palate Extraordinary. T. W. Brophy. *Surgery, Gynecology, and Obstetrics*, 1921, xxxii, No. 2, p. 182.

The author's remarkable observation concerned a case showing a cleft of the palate in the median line, with the premaxillary bones separated at the central suture and the palate cleft throughout the entire length. The patient was a girl fourteen months of age, whose lip also was divided in the median line; a central incisor tooth occupied each premaxillary bone. The lower teeth did not occlude with the upper teeth, but came in contact with the soft parts covering the palatal surfaces. Treatment consisted in moving the bones together by passing wire sutures through them, keeping the sutures above the hard palate. A double suture was carried through the bones in three different places. Heavy lead plates, No. 13 American gauge, were perforated in three places and double wires were carried through these holes and twisted upon the plates, a little force being applied so that the wires might be well tightened. Two anterior and two posterior wires were carried around anteriorly to the premaxillary bones and tightened. Ten days later, the slack was drawn out and the wires tightened under anesthesia, this tightening process being repeated at intervals of about ten days until at the end of the third month the anterior parts of the cleft (the separated premaxillary bones) were in contact and the edges posteriorly were nearly so. After the parts were approximated, all the wires were removed and new ones placed in the anterior

part through the openings occupied by the former wires. The surfaces in contact were freshened, the compact bone removed, and the cancellated bone exposed. The soft parts were sutured together, and the new wires were so tightened that the freshened bones were brought into immediate contact. The soft parts were closed by horsehair sutures. After six weeks, the lip was closed. One month after the closure of the lip, the hard palate along the edges of the cleft was denuded of the mucoperiosteum which was united, thus completing the operation. Since his favorable experience with this child, the author has moved together the bones in a patient of four years.

Dental Hygiene in Schools. F. Gonzalez Camargo. *Revista Dental*, 1920, xiii, No. 12, p. 356.

Buccal hygiene is the essential basis of preventive medicine in general, which without its assistance cannot accomplish satisfactory results. Mastication being the most important step in the digestive process, nutrition will be impaired if the formation of the alimentary bolus is not correct, and such a formation will be impossible if the tiers of teeth do not properly chew the food and if the salivary glands do not impregnate it with their juices. In view of the fact that at school-age the organism requires a larger amount of nutrient constituents, this being the time of greatest physical development as well as increased mental activity, the hygiene of the mouth is most necessary at this age. Physical impoverishment delays development and renders the organism more susceptible to the action of pathogenic agents. Carious teeth, ulcerated gums, suppurating fistulas, etc., not only prevent proper mastication, but constitute infectious foci, whose secretions when ingested are dangerous to the organism, giving rise to intoxications which often prove fatal. The general malnutrition of the system caused by the deficient mastication impairs the mentality up to the extreme degree of rendering the child unfit for the accomplishment of his school-work. Dental hygiene of school children should not be limited to prophylaxis, however, but should be extended to reconstructive operative dentistry. The state has the duty of watching over the health of the children who visit its schools, and must therefore impose dental hygiene in schools as an obligatory measure, providing for the primary instruction of inspecting dentists, and establishing dental clinics where the children can be cared for by experienced specialists. The National Odontological Association should duly contribute its knowledge, collaborate in the patriotic duty of improving the dental hygiene of school children, and assist the state in the organization of dental services for the primary schools of the country.

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EDITORIALS

Some Thoughts Relative to the Treatment of Posterior Mandibular Occlusion

IN THE November, 1920, issue of the International Journal of Orthodontia and Oral Surgery is an article by Dr. Calvin S. Case entitled "Principles of Retention in Orthodontia." This is a paper which was read before the American Society of Orthodontists in April, 1920, and deals with the retention of certain types of malocclusion in which it is necessary to change the antero-posterior relation of the teeth of one arch to occlude with the other. The paper is of particular importance because Dr. Case recites some of the difficulties which he has experienced in attempting to obtain normal arch relations in these cases and particularly in those cases which are characterized by a posterior relation of the mandibular to the maxillary teeth. Some of the results have been so unsatisfactory to him that he is inclined to look upon them as

failures. There is no question in our mind but that any one who has practiced orthodontia a number of years has encountered similar cases with equally unsatisfactory results. In other words, there is a small percentage of posterior occlusion of the mandibular teeth which does not respond to treatment that is successful in the other cases. The reason for the failure of these cases to respond to the usual types of treatment has not been exactly agreed upon, and the lack of satisfactory results may be the result of several things in each case. Dr. Case is inclined to attribute the cause of failure to inherited conditions, with which reasoning we cannot agree, but the fact remains that we still have these cases with us and some plan must be followed that will insure greater success than has been obtained sometimes in the past.

That present plans of treatment are not entirely satisfactory is proved by the discussion provoked by the paper in question. It is to be regretted that the men who were to discuss Dr. Case's paper did not discuss the principles of retention mentioned, but considered certain points which had no direct bearing on the principles involved. The important point of retention brought out in Dr. Case's paper, as it appeared to us, was that some means must be employed that will insure an actual forward movement of the anterior mandibular teeth and permanently retain them. This has not been accomplished by some of the plans of treatment outlined in the past.

We shall review some of the different plans advocated for the treatment of posterior occlusion of the mandibular teeth. In these cases, in order for normal relations to be established, it is necessary to bring all of the mandibular teeth forward the width of one premolar. Associated with the above named conditions is a lack of development of the mandible and a receding chin. As a result of these symptoms different plans of treatment have been suggested. One of these is the moving forward of the mandible with a view to changing the temporomandibular articulation. This is one of the oldest plans advocated and one which has given the smallest degree of success. The more successful plan is to move the mandibular teeth forward and leave the condyle in the anatomic position. This plan tends to produce a development of the body of the mandible and a development of the chin. If the forward movement of the mandibular teeth can be accomplished without the forward movement of the mandible, we will establish a result which will be highly satisfactory. However, the difficulty has been that in a certain number of cases, for various reasons, we do not obtain the forward movement of the mandibular teeth that is desired. In some cases, after the maxillary arch has been widened and during the course of treatment, the patient has developed the habit of protruding the mandible until the mandibular teeth assume a normal antero-posterior relation with the maxillary teeth. Some men contend that if this habitual protrusion of the mandible is continued long enough it will become a fixed position, but little has been presented to establish that fact and the large number of relapsed arches tend to disapprove it. We also find that these patients who have allowed the mandible to protrude as a result of the forward pull of the intermaxillary rubbers only hold the mandible in that position during rest, and masticate in the old posterior position. Some operators, as a result of the false position of the mandible, assume that the maloc-

clusion has been corrected, retain the case with the mandible in this false position, and when the retaining appliances are removed, the mandibular teeth relapse to their old position and the case is classed as a failure. In truth the case is a failure, not because of the limitation of the science of orthodontia, but because the orthodontist has been misled, and instead of moving the mandibular teeth forward, the patient has allowed the mandible to protrude and therefore the malocclusion was never corrected. Now, what was demanded in those cases was the forward movement of the mandibular arch with the condyle remaining in the anatomic position. In some patients it is practically impossible to get them to hold the mandible in the normal anatomic relation when the intermaxillary rubbers are being worn. That the necessity for the lengthening of the mandible has been recognized by many is proved by the fact that with Dr. Case's plan of retention in these posterior occlusions, the anterior teeth are carried forward, which actually lengthens the mandible sufficiently for the insertion of an extra premolar. His plan of retention indicates that the mandible should be lengthened.

We are of the opinion that with certain cases that are treated with a view to using Dr. Case's plan of retention more positive results will be obtained than with any other plan of retention up to the present time. The thing that appeals to us the most is, not the plan of retention, but certain phases of the treatment which carry the anterior teeth forward and thereby lengthen the mandible. It has been proved by the experience of many that in those patients who allow the intermaxillary rubbers to pull the mandible forward we do not get the increase in length of the mandible that we want. Now, if the mandibular anterior teeth are moved forward as Dr. Case suggests, there is bound to be an increase in the length of the mandible. Therefore, in following this treatment we have positively accomplished something that we were never sure of in some troublesome cases.

After the anterior teeth have been moved forward, which movement has not disturbed the anatomic position of the condyle, we then can use some means of retaining the mandibular anterior teeth in their normal position, and these teeth can also be used as a guide in preventing the patient from protruding the mandible. Furthermore, while the mandibular anterior teeth are being moved anteriorly, the molars in the mandibular arch remain in their positions of malocclusion and serve as guides in indicating that the patient is not shifting the mandible. Of course, it is to be assumed that while the anterior mandibular teeth are being moved forward, the maxillary arch is being widened in the canine and premolar regions and the incisors retracted so the mandibular anterior teeth will occlude with the maxillary incisors, in their normal position. As the case now stands, after the above treatment, we have the maxillary arch widened in the premolar and canine regions and the incisors retracted to make a normal arch. The condyle remains in the anatomic position it occupied before treatment as the molars remain in the original posterior position. The mandibular anterior teeth, which includes the canines and premolars, have been brought anteriorly and a space created for an extra premolar. In these troublesome cases we retain the maxillary teeth so as to keep the normal shape of the arch and retain the mandibular teeth

which have been moved forward so they cannot retract. From now on our efforts should be to move the posterior mandibular teeth forward and close the space we have created; the same as the plan used in moving the posterior teeth forward to close the space of an extracted tooth. With the anterior mandibular teeth retained so they cannot drop posteriorly, the maxillary incisors will act as a means of preventing the patient from protruding the mandible. By moving the mandibular teeth forward according to the above method, we are positive that the mandibular arch has been lengthened without the condyle being moved forward. As the teeth only have been moved forward, the mandible will not assume a distal position for it has not been changed. With the usual plans employed, the orthodontist is never sure he is not being deceived by the patient's protruding the mandible and making a better appearance than conditions justify.

We have seen patients who would allow the mandible to protrude as soon as the intermaxillary rubbers were placed in position. The intermaxillary rubbers do not therefore move the teeth, and the body of the mandible is not lengthened. However, by following the plan of moving the mandibular teeth forward in groups, (which is the only plan that can be followed in that class of patients if we confine ourselves to intraoral appliances), we get a lengthening of the mandible and a certainty of results that has not been obtained by any plan except that suggested by Dr. Case in his paper on "Principles of Retention."

NOTE: Since writing the above, we have learned that Dr. Jos. E. Johnson, of Louisville, has treated posterior occlusions by a similar plan.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The Eastern Association of Graduates of the Angle School of Orthodontia

The Twelfth Annual Meeting of the Eastern Association of Graduates of the Angle School of Orthodontia will be held on Saturday, May 28, 1921, at the Academy of Medicine, 17 West 43rd Street, New York City. The following program has been arranged:

- 1:30 P.M. President's Address, Dr. Earl W. Swinehart, Baltimore, Md.
- 2:00 P.M. The Saliva; Its Bearing on Mouth Conditions in General and Malocclusion of the Teeth in Particular, Dr. Henry C. Ferris, New York City.
- 2:45 P.M. Position in Utero as revealed by the X-ray and Its Probable Bearing on Malocclusion of the Teeth, Dr. B. W. Weinberger, New York City.
- 3:15 P.M. Limitations of the Lingual Arch, Dr. Robert H. W. Strang, Bridgeport, Conn.
- 4:00 P.M. The Modern Trend in Orthodontia, Dr. Frank A. Gough, New York City.
- 4:30 P.M. Business Meeting and Election of Officers.
Nominations for Officers 1921-1922:
 - President, Dr. C. A. Hawley,
 - Vice-President, Dr. Ira B. Stilson,
 - Secretary, Dr. E. Santley Butler,
 - Treasurer, Dr. Walter S. Watson.
- 6:30 P.M. Dinner. An informal dinner will be served at Gibson's (Healy's) Grill, 42nd Street and Madison Avenue, New York City. Please inform Dr. E. Santley Butler, 576 Fifth Avenue, N. Y. C., of your intention to be present.

Alumni Association of the International School of Orthodontia

There will be a meeting of the Alumni Association of the International School of Orthodontia at Hotel Baltimore, Kansas City, Mo., July 14 and 15, immediately following the annual session of that school.

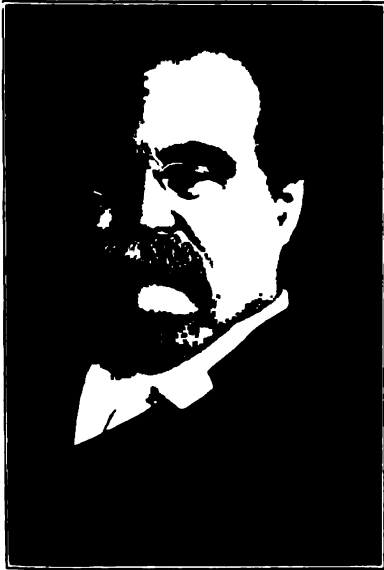
A cordial invitation is extended to all dentists who are interested in Orthodontia to meet with us. F. O. Gorman, D.D.S., President. Sidney S. Block, D.D.S., Secretary.

OBITUARY

George Alexander Bowman, D.D.S.

BY BURTON LEE THORPE

George Alexander Bowman, son of Joseph and Asenath Bowman, was born at Barnard, Vt., June 6, 1839. His early boyhood was spent on his father's farm. He attended the common school in the native village, and also had an academic course at Royalton and Newbury, Vt. Dr. N. W. Gilbert, an itinerant dentist visited his father's home; his exhibition of a case of fine dental instruments and some skillful dental operations, in which young Bowman was interested, was the incentive that led him into dentistry. He entered the office of Dr. Gilbert of Lowell, Mass., October, 1857. A year's tutelage with him and Dr. H. N. Roberts of Ludlow, Vt., was deemed sufficient to enable young Bowman to



open an office at Canton St., Lawrence County, New York, October 8, 1858, where in company with his brother, the late Dr. J. A. Bowman of Minneapolis, he practiced until September 20, 1862, when he came West, locating at St. Anthony's Falls, Minn., (now East Minneapolis). Here he stayed a year and a half. In May, 1865, he opened an office in Milwaukee. This he sold in October, and came to St. Louis, arriving November 9, 1865, first becoming associated with Isaiah Forbes, with whom he remained four years. Here he practiced until 1918 when he retired. He assisted in organizing the Missouri Dental College, chartered September 16, 1866, in which he was the first demonstrator of prosthetic dentistry, and for years a member of the Board of Trustees, and of the Clinical Staff. From this institution he received the D.D.S. degree February 22, 1867, at the first commencement exercises. He and Dr. A. W.

French of Springfield, Ill., were the only members of the class, and the oldest graduates of the school. He was President of the Missouri Dental College Alumni Association in 1891. Dr. Bowman joined the Missouri State Dental Association June 4, 1867; was its Secretary 1870-1-2, Vice-President 1875 and President 1876. He was President of the St. Louis Dental Society in 1873. He was an honorary member of the Illinois and Iowa State Dental Associations and President of the St. Louis Society of Dental Science, 1908. If Dr. Bowman was anything he was both an optimist and enthusiast. Always ready to learn from

the humblest member of the profession and equally ready to instruct. He was always experimenting with the new things in dentistry. Of an ingenious turn, Dr. Bowman invented a number of useful instruments, among them a gum retractor, which preceded the present rubber dam clamp. This was put on the market together with an improved clamp forceps, known as the "Bowman-Allen forceps," as well as a mouth mirror and cheek retractor. He was the first to use gutta percha root canal points. With an exceptional skill as an operator, he has done much to ornament and enhance his profession. His operations were all of the highest order of excellence.

He was married March 17, 1864, to Miss Jennie E. Homer of New York. To them were born George Homer, Jennie Elizabeth, Grace Adelle, Paul Homer, Ariadne Josephine, Florence Hope and Birdie Belle McKellops, a practicing dentist in St. Louis.

In politics Dr. Bowman was a Republican. He had no church affiliations, believing in "the fatherhood of God and the brotherhood of man" in the true sense of the word. In secret societies Dr. Bowman had been a "jiner." He was a Knight Templar of the Masons, a member of the I. O. O. F., Knights of Pythias, Royal Arcanum and Legion of Honor, in all of which he had filled the highest offices, and been prominent in the ritualist and dramatic work.

Possessing a fine tenor voice, he sang for twelve years in St. Louis church choirs, singing many times the tenor part of the Messiah, also took a prominent part in amateur operas, oratorios, etc. He was a member at one time of the old Philharmonic Society and of the Oratorio Society as well as of the St. Louis Club and the St. Louis Jockey Club.

The St. Louis Society of Dental Science of which Dr. Bowman was President, 1908, in recognition of his long and useful career and his contributions to dental surgery, gave a dinner in his honor on his golden jubilee, October 8. The writer presented, on behalf of the Society, a beautiful loving cup.

Dr. Bowman's death on April 2, 1921, came peacefully, like a benediction in the passing of his lovable spirit.

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No. 6

ORIGINAL ARTICLES

A FEW CONSIDERATIONS FROM THE ORTHODONTIC STANDPOINT*

BY W. W. WOODBURY, B.Sc., D.D.S., HALIFAX, N. S.

SIR WILLIAM OSLER, a short time before his death, in his inaugural address as President of the British Classical Association, spoke as follows:—"The extraordinary development of modern science may be her undoing. Specialism, now a necessity, has fragmented the specialties themselves in a way that makes the outlook hazardous. The workers lose all sense of proportion in a maze of minutiae. Everywhere men are in small coteries intensely absorbed in subjects of deep interest but of limited scope."

Now I think that is the position in which we dentists are in great danger of finding ourselves—or worse yet, not finding ourselves,—not realizing we are in that position! We as a profession have forgotten the rest of the body and have "become intensely absorbed in a subject of deep interest but of limited scope," and that subject is largely the mechanical restoration of lost tooth-tissue. In recent years, the more general considerations of bodily well-being and the dental factors relating thereto have been forced on our attention by men both within and outside of our own ranks, as they have worked away at the problems of infection, focal and otherwise, nutrition with all that it implies, and growth and development in general.

Sir William's remarks, apropos of specialization, might be supposed to be peculiarly applicable to one who essays to further subdivide, and confines his attention to one branch of dentistry; which in turn, we often refer to as being in fact, if not in practice, a division of medicine. But I wish to submit that orthodontia, if properly comprehended, is not narrowing, but furnishes the means for a most broadening survey of all the activities of dental science. Dr. LeRoy Johnson, of Boston, said to the writer recently in effect as follows:—"I do not know of any subject in the dental curriculum that provides the teacher with

*Read before the Nova Scotia Dental Association, Sept. 17, 1920.

such an opportunity for correlating the various subjects of the course." And having arrived at this point, and as a reminder that our idea is not so very new after all, I cannot refrain from a further quotation from Osler, in which this time he quotes Plato, who in insisting on the essential unity of all knowledge says as follows:—"Now when all these studies reach the point of intercommunion and connection with one another and come to be considered in their mutual affinities, then, I think, and not till then, will the pursuit of them have a value."

Johnson has defined orthodontia as "That branch of dentistry which treats of the forces controlling the form of the dental arch." Those forces are by no means understood as yet in their entirety, although some of them are quite obvious. But the important thing that I would wish to stress, is that of "forces in control"; not only forces that have controlled in the development of the arch, but forces actually in control every minute,—all the time. When once that idea is grasped, it is seen that the dental arch is not a fixed thing. Conklin, in his recent book "Heredity and Environment" says, "Living cells and organisms are not static structures that are fixed and stable in character, but they are systems that are undergoing continual change. They are like the river, or the whirlpool, or the flame, which are never at two consecutive moments composed of the same particles, but which nevertheless, maintain a constant general appearance; in short, they are complex systems in dynamic equilibrium." Those last two words to my mind, express the condition obtaining within the dental arch;—dynamic equilibrium.

Now any one who constantly has in mind this conception of dynamic equilibrium will be careful to do nothing that will tend to disturb or upset that condition. When tooth restorations are necessary, he will be careful to perform the operation, whatever the material employed, so that Nature's tooth form may be reproduced, to the end that proximal contact may be preserved, and the inclined planes of the cusps may function as was intended, and the pericemental attachment be shielded from injury. In doing this he will be definitely conserving three of the forces that enter into this dynamic equilibrium; for the preservation of proper *form* of proximal contact will insure that the *force* of proximal contact shall operate normally instead of abnormally; for operate it will. And the correct reproduction of cusp form will insure the normal functioning of the force of occlusion, which is one of the very important factors in the maintenance of arch form. And anyone who has so formed his restoration as to successfully provide for correct proximal contact and the correct inclined plane will, in all probability, have also attended to that other detail more frequently overlooked, and that is the proper sloping of that portion of the occlusal surface immediately adjacent to the point of proximal contact, so that under stress of mastication the food, with the exception of a negligible minimum, may be slid away from the interproximal space, rather than definitely and unavoidably into it, as is so often the case. In avoiding this latter condition he will be again conserving a factor in maintenance of arch form, and that is normal cell metabolism; the cell metabolism more especially of that tissue that normally fills the interproximal space. The other

side of this picture is of course, food packed into this space, with consequent inflammation and laceration, progressing rapidly toward resorption, and the probability of a well established pericemental infection.

And so another and very important result of this conception of the arch as a living thing, an assemblage of units, each one of which is not only accurately placed in relation to its fellows, but the whole acutely responsive to forces constantly at work, will be that one's minutest operation will always be done with a mental picture of its effect upon the whole, as a background, and it will be found that that whole will constantly enlarge, and the imagination will take in not only the dental arch but the entire organism.

If the loss of some part of a tooth is going to enlist the care outlined above in its restoration, we are surely going to look with dismay on the entire loss of the tooth. And right here, I wish that we might confine our attention to the deciduous teeth and the permanent teeth of children and young adults.

Added to the idea of dynamic equilibrium, which may quite accurately describe the condition of the established dental arch, we have in early life another influence present—that of growth. In considering this fact of growth, we can be a little more analytical than Topsy, who was quite sure that she "just grewed." We can see that growth is stimulated by some things and inhibited by others. And one of the factors of prime importance in normal growth is mechanical stimulus, or perhaps better, dynamic stimulus—the suitable application of force. So great a factor is this in the growth of bone that one eminent anatomist has defined bone as "calcified lines of force." In the case of the jaws this force is applied at least in two ways: first, through muscular attachment, and second through the functioning of the teeth. This does not exhaust dynamic stimulus, but probably accounts for most of it.

If all the teeth are present in early life and free from disease so that function is normal and pleasant, the dynamic stimulus, other things being equal, will be a powerful aid in the direction of symmetrical and vigorous growth. If teeth are diseased so that mastication is avoided because of the pain involved, with a consequent let up of muscular action, just so far will normal growth be prejudiced, to say nothing of the attendant damages of infection. And if teeth are actually lost, our condition of dynamic equilibrium is not only going to be sadly disrupted, but, the chances for symmetrical development are going to be greatly impaired. And we know that this applies to the deciduous teeth as well as to the permanent ones. There is no need for laboring this point, the truth of which we would all willingly subscribe to; and the writer is not so long removed from general dental practice that he is not fully aware that it is much easier to stand up and preach absolute conservation of all teeth than it is to actually carry it out, when it comes to office routine. Yet it surely does no harm to contemplate this ideal frequently.

Our next logical step would carry us further afield than the confines of this brief paper and would point to the consideration of prophylactic care

of the mouth and the enlightenment of the people in these important matters: preventive dentistry and popular dental education.

A well-known magazine writer recently said: "Form the habit of devoting a few minutes every day to thinking about your work in a large, broad, imaginative way. Try to see it for what it assuredly is—a vital necessity to yourself and a useful service to society." I would like to suggest in closing that if one gains the conception outlined above of the essential unity of all our apparently separate and often minute operations, there will be no need for the setting aside, artificially, by an act of will, the aforesaid "few minutes", but this will just naturally be the atmosphere in which we will work all the time.

SIMPLIFYING MODEL TRIMMING*

BY BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY

DURING the past few years a number of machines have been devised purely for model trimming in orthodontia, at the same time photo trimmers and other appliances have been made use of or modified to accomplish the above purpose.

It is my intention to present a means, which is simple, positive, and easy

Fig. 1.

Fig. 2.

to manipulate, an instrument which I have used for over two years with perfect satisfaction.

Although I have not seen it mentioned or demonstrated heretofore, it would not surprise me to learn of others who have used this same plane. At any rate it has been such a time saver in my own practice, that I feel it my duty to present it as well as a few other devices for your consideration.

*Clinics given before the American Society of Orthodontists, Chicago, April 3-7, 1920, and the Eastern Association of Graduates of the Angle School of Orthodontia, New York, April, 1920.

Before describing it, permit me to state that these devices can be purchased at any hardware or department store and need no modification, except that the plane I have in use was heavily nickel plated, first receiving a copper coating, and then the nickel, otherwise there has been no change.

Fig. 1 is a cut taken from the catalogue of the Stanley Rule and Level Co., (New Britain, Conn.) and is known as the "Stanley Shoot Board and Plane," No. 52. It is a combination of plane and shoot board. The board, *A*, is made of special iron, is of ribbed construction, and has an adjustable runway, accurately machined for the plane.

The swivel *B*, is indexed at forty-five and ninety degrees for planing a

Fig. 3.

Fig. 4.

mitre or square, but can be securely locked by means of a clamping screw (*C*) at any angle desired, between zero and a hundred and eighty degrees, the quadrant being graduated between zero and ninety degrees. The swivel is also fitted with a sliding back (*D*) that can be adjusted close to the plane, thus supporting the work. This back is at right angles to the base.

The plane (*E*) fits in the runway (*F*) and is also at right angles to the base. It is sufficiently high to take in almost all cases, the top and bottom. Instead of the blade being placed at right angles to the side, in this plane it sets at such an angle that the top strikes the model first and as the plane slides forward, it gradually cuts the plaster.

Fig. 2 shows the base with the model in place and the swivel adjusted to the side of the model.

Fig. 3 the front of the shoot board with the plane at the back of model, and the model in place. One can readily see the advantage of the blade being set at the angle as illustrated.

Fig. 4 illustrates the front of the plane and shows the model at right angle to the base, to the plane and the swivel. All one needs to do is to follow the line drawn on the model and time does not need to be consumed in constantly testing the angle, for we know if the model is held securely, it must be at right angles to the plane.



Fig. 5.

Fig. 6.

Fig. 7.

Fig. 7.—Universal bevel applied to the model. Unfortunately the one-sixteenth in steel, soldered to the part applied to back of the model, appears as a mere line. This piece one and one-half inches high and three inches long is soldered at the center, so that three-quarters of an inch appears above and below the bevel to prevent tipping.

In trimming the models the first step is to determine the base and draw a line around the plaster. Then trim with the smaller plane as shown in Fig. 5. After the base has been secured the upper and lower models are planed in occlusion and a small mark is placed sufficiently back of the molars on one side. With a compass a corresponding mark is then placed on the other side of the lower and then the back is trimmed.

To obtain the sides, a small Universal Bevel No. 15 as shown in Fig. 6 is

used. Have found it practical to solder at a right angle to the part marked *A*, a piece of 1/16 inch thick steel, and an inch and a half high. This gives a steady base. I then place this against the back and adjust the other end over the buccal cusps of the teeth as shown in Fig. 7, *A-B*. Then tighten the set screw. Afterwards it is only necessary to draw on the upper part of the model the line *E-D*. Place this line directly over the runway and adjust the swivel. Repeat this for the other side by adjusting the bevel first to correspond with the buccal side of the teeth. A great many men prefer to make all the sides of corresponding angles with the back. I personally feel that this is wrong, for our models in the beginning should show us the unsymmetrical development of the arch, and if the sides are trimmed to the buccal surfaces of the teeth, this angle should vary and should give our first idea of treat-

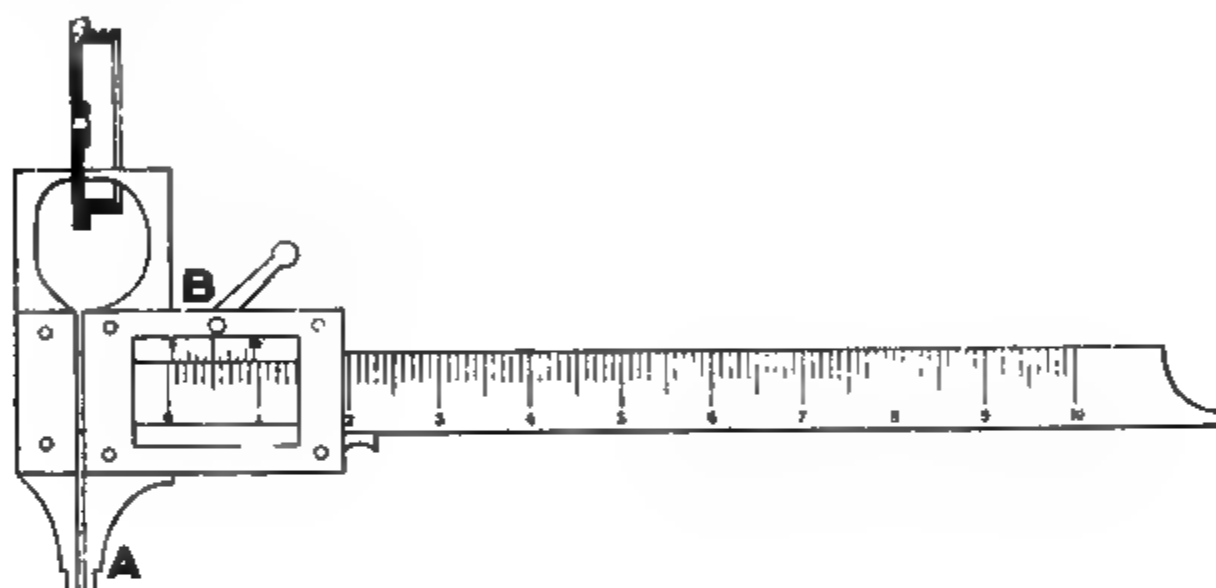


Fig. 8.

Fig. 9.

ment. After the sides have been obtained, the line in front is drawn with a compass and cut with a knife to about this mark. The model is placed once more on the shoot board and the plane held firmly on it. With the left hand the model is rotated slowly against the blade, giving a fine even surface, at the same time being trimmed at right angles to the base. This is one of the advantages of using the plane.

The sharp angles at the base and sides can be secured by means of the Boley Gauge, Fig. 8. This gauge has also been modified by removing the top part at *B*, and tapering the points at *A*, until it resembles Fig. 9. Setting this gauge at 5 mm. for the smaller models or 7 mm. for the larger ones, adjust one point on the back and turn the gauge until the point of the angle is opposite *A*, in Fig. 9, the other edge will then touch the side. This adjustment can readily be obtained after a while with the eye and then draw both lines at the same time, trim to these lines.

The top is easy to obtain in the following manner, first determine the height, this being one-third greater than the anatomic portion and describe a mark. Then place a flat piece of metal on the base of the lower model. For this I use the Stanley No. 0 Steel Scraper 3" x 4", Fig. 10, which can also be used to start the top and bottom by scraping to the mark, before planing. With the models in occlusion, adjust the Boley gauge from the steel base to the mark on the upper, describe a line around the upper, sliding the gauge over the steel scraper. We are then positive that the upper is parallel with the lower. By first using the small plane and then the larger, in no time

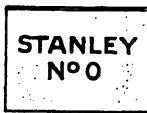


Fig. 10.

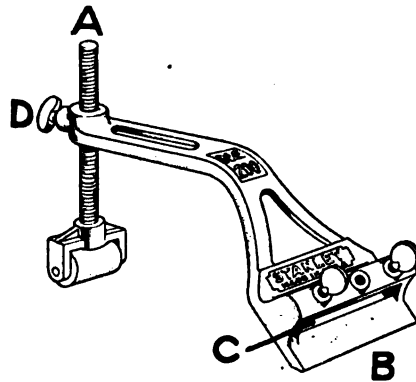


Fig. 11.

our models have been completed, with smooth even surfaces all at positive right angles. Since using this method the time consumed in trimming models has been reduced over one-third.

Fig. 11 is another useful device that can be secured from any hardware dealer and is used for sharpening the blades of the planes. The blade is placed in this insert at *C*, while *B* rests slightly above the carborundum stone. This angle can always be made the same by adjusting the roller part *A*, to the required height, the thumb screw, *D*, holding it firmly.

HEREDITY AND VARIATION ETHNOLOGICALLY CONSIDERED *

BY CALVIN S. CASE, M.D., D.D.S., CHICAGO, ILLINOIS

IF THE parents come through long lines of normal symmetrical forms of proportionate size in relation to each other, the offspring will follow the normal type,—barring natural variation and atavistic heredity from distant inharmonious progenitors. If one of the parents is characterized by some definite disharmony of features, as a marked disproportion in the size of the nose, the ears, the jaws, the teeth, etc., there may arise in the offspring any one of a number of definite forms of products, or their blending gradations; the dominant and recessive types being largely dependent upon the strength or persistence of parental strains.

It is not a rare occurrence, as stated in the previous chapter, to find in one such family a child having features which show a blending diminution of disharmonizing characteristics; another will show a predominance of the type of one parent or the other; and in another will be seen the disharmonizing features of one parent in immediate association with features which are distinctly that of the other, etc. Thus, every variety of change and interchange of *inheritable* features and characteristics—or those which have not arisen in the individual from extrinsic causes or environment—possessed by parents, may arise in the offspring from direct inheritance.

Again, a child of fairly symmetrically formed parents will have some one part of the face quite out of proportion in size, form, or relative position to the otherwise harmonious features, but one which has been a characteristic feature of a grandparent or great grandparent, or known to have had existence in some more distant progenitor. Moreover, the laws of heredity present a variety of possibilities which can neither be regarded as direct, nor as atavistic heredity *per se*.

Mothers who have brought their children to orthodontists have frequently said: "I don't see where the child got those prominent protruding teeth, neither his father nor I have teeth like that, and so far as we can learn no member of either of our families for generations back ever had such teeth." This does not refer to the many similar expressions from the lips of loving mothers upon the eruption of the first permanent incisors, which are always far out of proportionate size with the "baby" teeth and childhood features, and thus erroneously regarded as abnormal; but as the case in question may

*This article is revised from the fourth of five chapters of Part II entitled "Etiology of Malocclusion" in the forthcoming revision of "Dental Orthopedia" by Calvin S. Case. The first chapter entitled "Etiologic Principles of Malocclusion with Reference to Treatment," was published in the September, 1920, number of Dental Items of Interest. The second and third chapters entitled "Etiologic Influences of Deciduous and Erupting Permanent Teeth with Principles of Treatment," and "Laws of Biology Regarded as Etiologic Factors in Malocclusion," were published, respectively, in the March and April issues of this journal. The last chapter which we hope to publish in the June number is entitled "Practical Application of Biological Laws."

be one of the dento-facial protrusions, let us suppose by way of examining biologic possibilities from a scientific standpoint, that it is one of those extreme cases of bimaxillary protrusion in which the entire dentures of both jaws are protruded in relation to the mandible and other bones of the skull; this deformity being always enhanced by a "receding chin effect." (See Fig. 1.)

We shall take for granted it is true that no one in either of the two immediate families referred to above, ever had a similar condition of the teeth, and that the said patient is a child of legitimate birth. If this condition of pronounced bimaxillary protrusion were one of very great rarity, seen perhaps only once in a lifetime, it would be called a "freak" by many. Others who are firm in their belief of atavism, even through many generations of progenitors, would see in it a recurrence of some former type. But as this partic-

Fig. 1.—The above shows the common facial type of bimaxillary protrusion.

ular form of malocclusion, in different degrees of its prominence, happens to be one of somewhat common occurrence, seen plentifully in large cities of nations composed of mixed races, there is every reason to believe that this and other irregularities of the teeth and jaws have at times arisen through the activities of "Mendel's Law" in biologic generation, *which precludes the usual hereditary necessity that some one of the forebears must have been characterized by a similar general disharmony of the features.* Modern biologic investigations in crossbreeding have abundantly proved that combinations of the most complex nature may be brought about through the activities of this law, with results which are at times highly beneficial in the offspring, and again with results which are exceedingly abnormal in appearance, and so deficient in

adaptive variations, that—under the law of natural selection—they soon become extinct.

MEDEL'S LAW

In the short space of this chapter it will be impossible to give more than a glance at recent investigations along this line. The student is referred to any one of the modern works upon biology for a fuller description. The following excerpt from a recently published textbook entitled "Biology," by Stackpole, teacher of Biology in Columbia University, will give a brief summary of this phase of heredity: "Much attention has in recent years been given to the experimental study of variation and heredity. These experiments are of interest in connection with Mendel's law, a law so important in the science of biology that Professor Bateson has written of it: 'The experiments which led to this advance in knowledge are worthy to rank with those that laid the foundation of the atomic laws of chemistry.' The discoverer of the law was Gregor Johann Mendel (1822-1884) an Augustinian monk. * * * To gain an idea of the scope of these principles, one cannot do better than turn to Mendel's own account of his experiments. Punnett's 'Mendelism' and Thomson's 'Heredity' give such an account:

" 'The new science of heredity has much to teach the practical man' says Punnett. 'Let us suppose that he has two varieties, each possessing a desirable character, and that he wishes to combine these characters in a third form. He must not be disappointed if he makes his cross and finds that none of the hybrids approach the ideal which he has set before himself; for if he raises a further generation he will obtain the thing which he desires. He may, for example, possess tall green-seeded and dwarf yellow-seeded peas, and may wish to raise a strain of green dwarfs. He makes his cross—and nothing but tall yellows result. At first sight he would appear to be further than ever from his end, for the hybrids differ more from the plant at which he is aiming than did either of the original parents. Nevertheless, if he sow the seeds of these hybrids, he may look forward with confidence to the appearance of the dwarf green (in proportion of 1 to 3 of the dominant tall yellows) and owing to the recessive nature of both greenness and dwarfness, he can be certain that for further generations the dwarf greens thus produced will come true to type.' "

Experiments with mice and many of the lower animals have so repeatedly confirmed these results in all instances where the conditions and requirements are fulfilled, that the principle is now recognized as one of the established laws of heredity. One who is skilled in crossbreeding can produce in the offspring any combination of characters or strains which are well established by heredity in the parent stock. Not only that, but he can cause to be completely dropped from the combination in the offspring and subsequent generations of the type, strongly marked characters of the parent stock. For examples, look at the work that Burbank is doing today.

Now let us apply this law to our patient whose protruding teeth seem to have arisen from no cause. Both parents may have passed down from long lines of typically formed progenitors, both families of which were fairly symmetrical in physical forms, according to racial type, and yet when the two lines are compared with each other, they are genetically quite disproportion-

ate in size, physique, and character of features; the one characterized by large strong bones, muscles, and sinews, as occurs with dominant types in certain tribal races, while the other family is built on a more delicate effeminate plan, and yet with this strain of its characteristic type none the less persistent.

When one considers the endless variety of unions which arise in mixed races, it must be realized that it is no far-fetched proposition that marriages have and do take place between dissimilar types who possess all the exacting requirements which place them under the rule of Mendel's law, and with the strong probability that the first offspring of these unions are characterized by the dominant type,—as in the production of the "tall yellow" peas. Let

Fig. 2.—Three views of the Piltdown skull as reconstructed by J. H. McGregor, 1915. This restoration includes the nasal bones and canine tooth, which were not known at the time of Smith Woodward's reconstruction of 1913. One-quarter life size. Copyright, 1915, 1918, by Charles Scribner's sons. "From 'Men of the Old Stone Age,' by Henry Fairfield Osborn; by permission of the publishers."

us suppose that this pertains to the large heavy bones and teeth of the stronger parent. If this character of offspring should meet and marry other similar offspring that have arisen in the same way (which is more than possible) in the second generation there will be a strong hereditary tendency for a recessive type to arise, or parts of the recessive in combination with the dominant. This means that undiluted physical characters, parts or properties of the delicately constructed grandparents upon one side, will arise in combination with the strongly marked physical characteristics of the other grandparents, both of

whom composed the original characters of these distinctively dissimilar types. It is not more than possible that this typical mixture may express itself through the laws of heredity by a disproportionately large mandible or maxilla or both as compared to the other bones of the skull of the individual, or may it not be the large strong teeth of the dominant type in combination with the smaller and more delicate jaws of the other as in cases which Dr. Cryer has mentioned? The large teeth striving to force themselves into the small jaws are with their alveolar processes naturally carried forward rather than backward, because of the obstructing rami and tuberosities, with the production of any one of the decided dento-facial protrusions; and through the same biologic processes that have produced other imperfections in facial outlines by an asso-

Fig. 3.—The Piltdown man of Sussex, England. Antiquity variously estimated at 100,000 to 300,000 years. The ape like structure of the jaw does not prevent the expression of a considerable degree of intelligence in the face. After the reconstruction modeled by J. H. McGregor. "From 'Men of the Old Stone Age,' by Henry Fairfield Osborn; copyright, 1915, 1918, by Charles Scribner's Sons. By permission of the publishers."

ciation of immediate parts of physiognomies that are inharmonious in size or relation.

Through careful artificial selection in the processes of hybridizing, excessive protruding mandibles and teeth of bulldogs have been produced, together with equally marked physical variations in domesticated animals, fruits, flowers, etc., and too through methods of crossbreeding not unlike those which possibly may, and very probably do, obtain in the multitudinous variety of natural unions of dissimilar types in the human race, which so often result in disharmonious combinations in the facial outlines of individuals.

The short upper jaws and prognathic mandibles of pug and bull dogs arose

originally either from a natural variation or from cross fertilization. This has been increased to the present types largely by selective breeding or hybridization. For bench show purposes this biologically developed abnormality is still further enhanced artificially in the individual by mechanical devices which inhibit the growth development of the maxilla, and through the same channels of forces that obstructive diseases produce pathologic inhibitions. Physical changes in the individual, wrought in this way from intrauterine, postnatal, or any of the extrinsic local causes, however, are never transmitted to offspring, it being one of the accepted laws of biology that all inheritable characteristics invariably receive their propagating qualities during the metabolism of the germ cells.

It has been erroneously asserted that "nature does not place in one organ two or more parts that are disharmonious in their sizes," also that "it is impossible for two component parts of any section derived from the same embryonic bud of development to be in disharmony with the whole." This is abundantly disproved by the many disharmonies in closely related parts repeatedly exemplified everywhere by heredity alone. Moreover, it is one of

Fig. 4.—From a photograph of a lad suffering from hypertrophy of the gums and alveolar process. (Cryer.)

the most constant and expected products of hybridizing. Were it not for this, we would not today be enjoying the great variety of fruits and flowers of our times.

In regard to this phase of the subject, it may be pardonable to quote the words of a prominent biologist to whom this principle of teaching was submitted for criticism: "A statement like—'nature never puts teeth into a mouth that do not belong to that physiognomy,' always arouses my ire. Variation is so thoroughly the rule in nature, not only in individuals, but in parts of individuals, that there is *just as apt to be disharmony as harmony.*"

In this connection it may be interesting to note certain evidences for the theory of far-reaching atavistic heredity, by comparing the physiognomies and jaws of the present quite common bimaxillary protrusion of the dentures,

shown in Fig. 1 with the physiognomies and jaws of early prehistoric peoples, shown in Figs. 2 and 3, which are from a recently published work entitled "Man of the Old Stone Age: Their Environment, Life, and Art," by Henry Fairfield Osborn, of the American Museum of Natural History, and Professor of Anthropology in Columbia University, published by Chas. Scribner's Sons. By permission of the Publishers.

The receding chin was such a predominating characteristic of the early races of the old stone age that they are frequently spoken of as the "chinless men." In other words, their stage of evolution still had left stamped upon them certain characteristics of the teeth and jaws which doubtless had arisen in their anthropoid progenitors from prehensile needs. This consisted in protruding dentures in relation to the maxillæ in which they were placed, a condition of all ape tribes and common to Negroid races. And though this type prevailed ages before the chin development of the mandible, which later characterized the men of the upper palæolithic age and the present "homo sapiens," it will nevertheless be seen that the facial outlines of these early races

Fig. 5.—View of the under surfaces of skulls, showing difference between Fan Tribe West African Skull and the Caucasian. (Cryer.)

was not far unlike those of many physiognomies of today, which are, from some form of heredity, characterized by the same bimaxillary protrusion of the dentures, or with the same receding chin effect as the chinless men.

In the illustration of a paper read before the 1913 meeting of the National Dental Society, the author presented fifteen cases of bimaxillary protrusion. In nearly all the cases shown, the buccal teeth were as perfect in alignment and occlusion, as we commonly find in normal dentures. With the exception of one of these cases, so far as can be learned, no condition which resembled this character existed with the parents or any of the known forebears; and this was true also of Dr. Cryer's case (see Fig. 4).

One thing which very strongly illustrates the persistent forces of heredity in physical structures and their relations, which have arrived at a condition of equilibration or state of high perfection in relation to environment, is obtained by a careful study of the photographic pictures of the jaws and dentures of prehistoric man, and the scientific restorations found in many of the illustrations of Professor Osborn's book, one of which is shown in Fig. 2. It proves

that the inherited standard type of normal occlusion of the human dentures—contrary to the opinion of many teachers of modern orthodontia—has come down to us essentially unchanged through the ages from the prehistoric men of the “old stone age,” and kept in line through “the law of natural selection” (“survival of the fittest”), and its perfect adaptation to needs.

Even as far back as the second “interglacial period”—200,000 to 350,000 years ago—the forms, number, and relative position of the teeth and their buccal occlusion were essentially the same as the standard normal occlusion of today. And though in earlier stages of that vast period, the jaws were of a heavier type and the bimaxillary protrusive mouths, enhanced by chinless mandibles, showed their distant descent from their anthropoid progenitors, the occlusion of the teeth, their alignment and arch form—even the canines which had thrown off nearly all their carnivorous characteristics—*were all practically the same as today*. In this connection compare the protruded malposition of the dentures in relation to the maxillæ and mandibles, shown in Fig 2, illustrative of the men who lived hundreds of thousands of years ago, with illustrations of more recent skulls; first, the Fan Tribe West African

Fig. 6.—Side view of a prognathous negro skull with eighteen teeth in the upper jaw. (Cryer.)

Negro, Figs. 5 and 6, and second, Dr. Cryer's patient, Fig. 4. He assures the author that in the latter case the buccal teeth were in normal occlusion.

There is no doubt in the minds of advanced anthropologists that the form, structure, and relation of the bones of the human skull, like those of other bones of the body, were evolved from beings very much lower in the animal scale, through the unwavering laws of heredity, variation, natural selection, and influences of environment. And that peoples from the very earliest age of man up to the present time, through segregations in distantly located parts of the globe, presenting marked differences of environment, have become, through slight ethnologic variations during many ages, the different races, characterized by distinct types in color and character of skin and hair, and of physical framework of physiognomies.

While there are at present only three markedly distinct races—the white or Caucasian, the yellow or Mongoloid, and the black or Negroid—through admixtures by intertribal relations and more distant migrations, many quite distinct races have been formed, with the production of intervening types, of

which it is said, if they could be collected and compared, would blend into each other with imperceptible gradations.

This is a subject which pertains to the established sciences of stomatology and ethnology—branches of anthropology—which are today taught in our colleges, and which are founded upon many years of patient careful investigations by the most learned scientific minds.

It is shown that the present white race, more than any of the others, is decidedly a mixed race, there being few if any left of the original representatives of the Caucasian type, to which we are accustomed to refer as the standard of beauty and physical perfection. Yet because of the fact that our taste and appreciation of these qualities are being varied under the same adaptive guiding forces of evolution which have characterized the physical, we not uncommonly meet with types which fully accord with our own understanding of manly and womanly beauty and perfection. This doubtless has been true also of all isolated races of peoples, the more primitive of which we would now regard as exceedingly unattractive and perhaps repulsive.

BLUEPRINT CHARTS AS AN AID IN TEACHING OF ORTHODONTIC TECHNIC

BY JOHN RUSH MCCOY, D.D.S.,

Associate Professor of Orthodontia, College of Dentistry of University of Southern California

THE teaching of orthodontic technic in our dental colleges has always been a difficult problem.

In view of the fact that a large proportion of our dental graduates locate in small cities where they are called upon to treat simpler cases of malocclusion, I am a firm believer in a practical course in orthodontic technic which will make them better fitted to handle such cases in an efficient manner.

Any professor of orthodontia who has attempted to present a technic course by means of lectures has encountered considerable difficulty in impressing the student with the details of every step of the work and has found that innumerable questions will be asked, due to the students having misunderstood or forgotten some point in the lectures.

In order to eliminate any questions as to the proper course to pursue, I have prepared drawings, had tracings made, and sufficient blueprints to distribute around the technic room where they can be examined and consulted by the students. They appreciate it and the saving in time for the instructor and the student is considerable as there is no question at any time as to the proper course to follow. The accompanying illustration is reproduced from a photograph of the blueprint tracing, which is much larger, being 16x21 inches.

One reason that many technic courses in the past have been failures is that our profession has been imbued with the idea that an orthodontic appliance must necessarily be of a patented variety, consisting chiefly of screws, nuts, etc., so the students in our best institutions were put to work turning out these mechanical contrivances which were necessarily the product of lathe, tap, and die work and which the student can buy put up in very much better form at the supply house.

For the appliance technic I have selected the very simple lingual arch as demonstrated by Dr. John V. Mershon, consisting of a stable base wire with fine auxiliary springs.

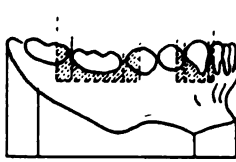
In presenting this to the student it is possible to give him something which is almost universal in adaptability and, thanks to Dr. Mershon, it does not possess any fancy patented features, neither are its virtues placed in the advertising columns of our journals.

For some reason it has been the custom generally to have students construct appliances on plaster models, but owing to the fact that plaster of paris does not have sufficient strength or hardness, this has proved a rather unsatisfactory method. In our technic course we use artificial stone for the

ORTHODONTIA TECHNIC

COLLEGE OF DENTISTRY Univ of So Cal

Arranged and Drawn



Orthodontia band technique on artificial stone

Casts are made of artificial stone. First molars and cuspids are isolated to about one to two millimeters below gingival margin. It is necessary to use the saw at four points to isolate each tooth. At the contact point on either side and at about the middle of the adjoining tooth.

After sawing to about one to two millimeters below gingival margin these sections included are removed and the tooth carefully shaped up with chisels to its normal contour when adjacent tissues are removed.

Measurement of greatest diameter of tooth is secured with a fine wire which is cut, straightened out and laid on band material of .18 inches in width and .007 inches thickness for molars. Same width and .004 thickness for cuspids.

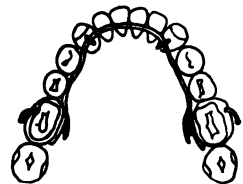


The Marshon Lingual Arch Gold platinum spring wire .026 diameter is cut length of distance from distal of first molar lingually to center of arch anteriorly. Solder half round shaft 1/8 of an inch from end of wire. This wire is carefully bent to contour of the arch at gingival margin of the teeth.

A bend is made just anterior to first molar to bring wire to this position. From the lower angle of this curve .026 wire is soldered to form a lock. Half round shaft must be removed from tube each time wire is bent to avoid distorting tube. When similar wires are bent on each side they are soldered anteriorly while in place on the model.



Cuspid bands have spur of .026 soldered lingually so it will rest on arch wire and maintain its position.



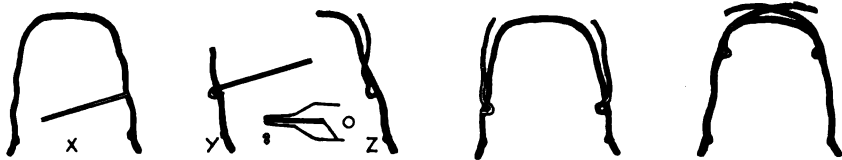
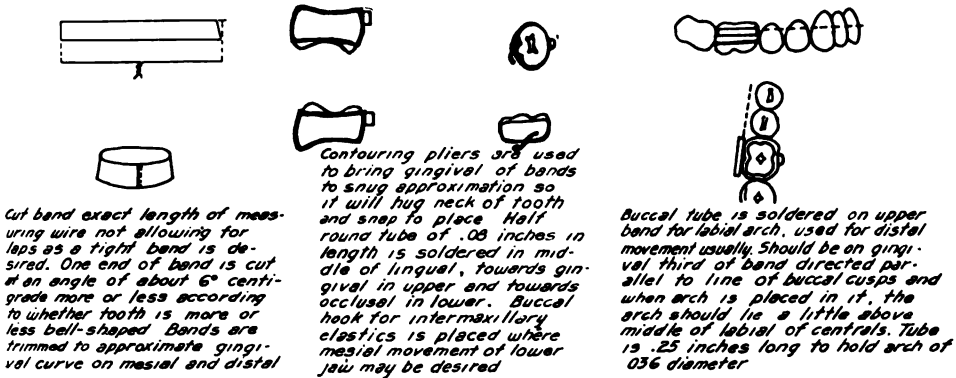
All movements are accomplished. Above shows spring bent to lingual to draw cuspid into line. Rotation is accomplished by bending labial and attaching one angle to arch with ligature and applying pressure with auxiliary spring on other angle. Space for impacted bicuspids is opened up with large loop.

Auxiliary springs are bent so that they occupy position of dotted lines when out of the mouth, so when put to place there will be constant pressure upon the malposed teeth.

Arch wire in position in lower jaw before auxiliary springs are placed. Lock wires snap over lower end of half round tube. Buccal hooks are placed if mesial movement is desired.

Fig. 1.

by John R. McCoy, D.D.S. ASSOCIATE PROFESSOR OF ORTHODONTIA

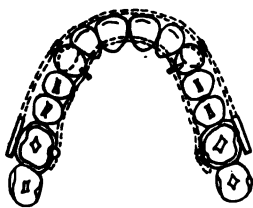


These arches are viewed from gingival toward occlusal. That is, attachments are on gingival side. To place auxiliary springs .022 gold platinum spring wire which has been drawn through a draw plate since annealing and is soldered at right angles to arch as in Fig. X (soldered with 14K solder).

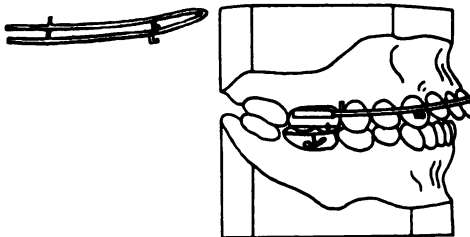
Fig. Y Small nose pliers are used to grasp .022 wire next to arch wire while the .022 is bent back upon itself completely a little more than a half circle.

Fig. Z Small flat beak pliers grasp .022 wire where it crosses arch wire and hold while it is bent back in direction of arch wire. This completes spring.

Springs can be placed in any manner desired. Placed laterally as at left expansion is obtained. When anterior development of arch is desired, a combination of the two as above may be arranged.



Upper arch where distal movement is desired. Lingual arch used to accomplish development and then labial arch placed. .026 hooks placed opposite cusps.



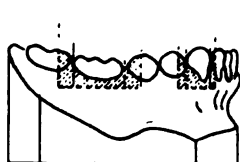
Combination to be used where lower arch is moved mesially and upper distally. A lug is placed on the .036 gold platinum arch wire just anterior to buccal tube so that there will be slight pressure on incisors until they have assumed position and then pressure is transferred to entire arch.

Fig. 1.

ORTHODONTIA TECHNIC

COLLEGE OF DENTISTRY Univ of So Cal

Arranged and Drawn

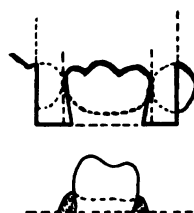
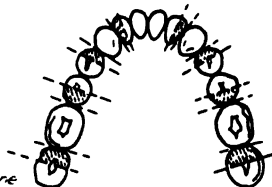


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The Merzhan Lingual Arch Gold platinum spring wire .036 diameter is cut length of distance from distal of first molar lingually to center of arch anteriorly. Solder half round shaft 1/8 of an inch from end of wire. This wire is carefully bent to contour of the arch at gingival margin of the teeth.

A bend is made just anterior to first molar to bring wire to this position. From the lower angle of this curve .026 wire is soldered to form a lock. Half round shaft must be removed from tube each time wire is bent to avoid distorting tube. When similar wires are bent on each side they are soldered anteriorly while in place on the model.



Cuspid bands have spur of .026 soldered lingually so it will rest on arch wire and maintain its position.



All movements are accomplished. Above shows spring bent to lingual to draw cuspid into line. Rotation is accomplished by bending labial and attaching one angle to arch with ligature and applying pressure with auxiliary spring on other angle. Space for impacted bicuspids is opened up with large loop.

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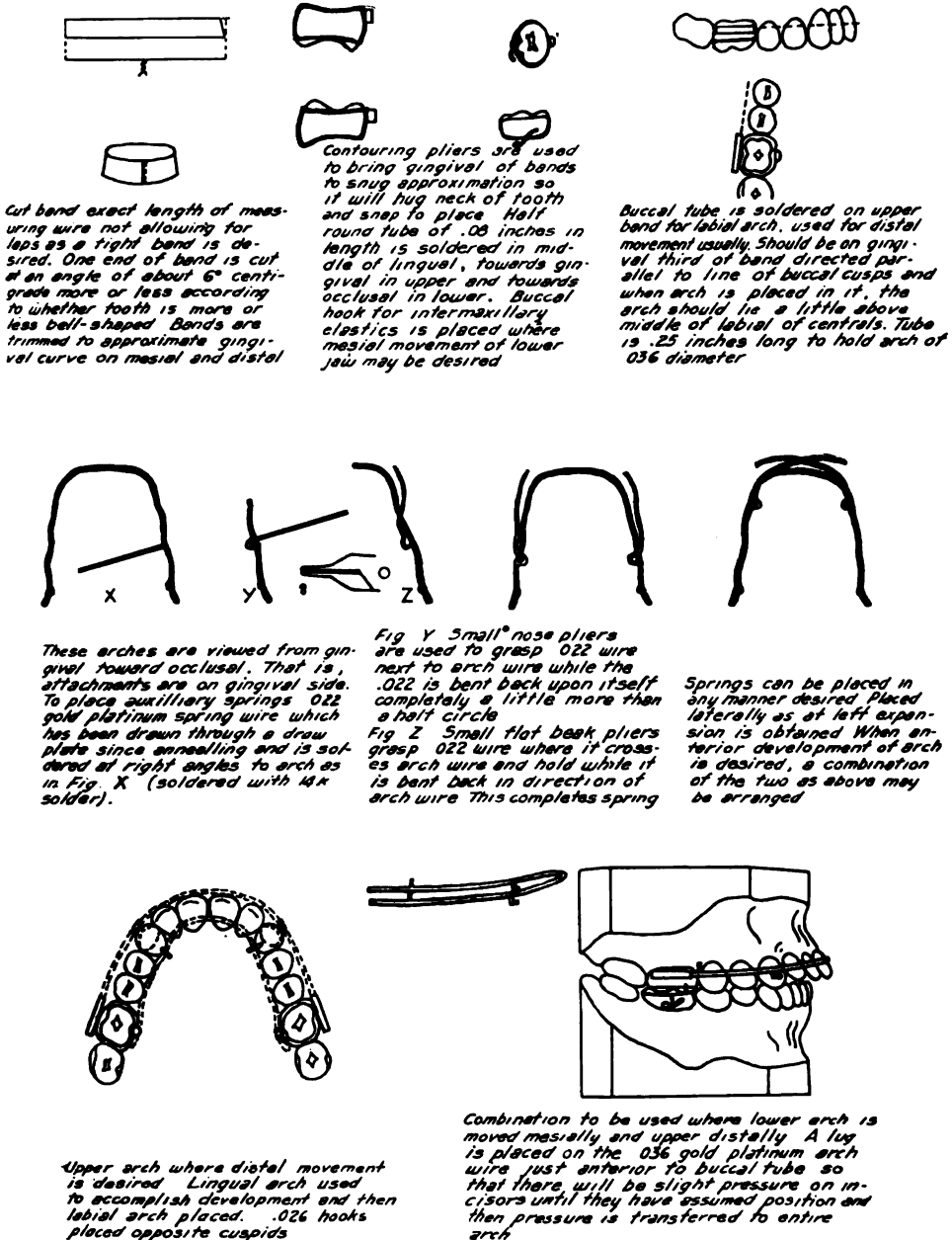


Fig. 1.

models upon which the appliances are to be fitted which give a far more stable and unyielding model upon which to adapt the appliances.

The technic followed in the chart is practical in every detail, its being the practice now in our office to make stone models of each case and fit appliances in the manner set forth here, thereby saving the little patients much wear and tear incident to having appliances fitted directly in the mouth.

As to the isolation of the teeth, a fine separating saw should be used at the proximal contact points and a heavier saw elsewhere. When the sections between the points of sawing are removed the ordinary straight enamel chisel is an excellent instrument for shaping the sides of the tooth. A good knowledge of dental anatomy is naturally of considerable value in shaping up the teeth to which bands are to be fitted as the portion of the model representing adjacent soft tissues must be removed, leaving exposed the full crown portion and part of the root portion.

The chart is self-explanatory, but, like all things, it must be followed very carefully as one step omitted would curtail the value of the final results.

Gold-platinum combination spring wire and band material are, of course, the proper materials for the construction of the appliances but one would hardly require a student, unless he so desired, to go to the expense entailed by their use when nickel silver in sizes and forms as shown can be substituted in conjunction with a low fusing solder so that the temper is not drawn from the wires which would at once defeat the object of the appliance.

I am presenting this method because it has aided us considerably and the idea might be of use to some one else who is struggling to teach a dental student some of the essentials of orthodontic technic.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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CLEFT PALATE AND HARELIP PROCEDURES*

BY TRUMAN W. BROPHY, M.D., D.D.S., CHICAGO, ILL.

THERE are two objects to be attained in cleft palate operations: Normal anatomic relations, and correct function. The first step towards normal anatomy is to make use of the separated bones in such a way as to establish just as nearly as possible a normal palatal arch. Now, how can this be done? It certainly cannot be done by closing the lip over the greater congenital deformity and concealing it from view, leaving the patient deformed, to remain so to the end of life. A surgeon who would close the lip first and partially cover the deformity, does his patient, though unconsciously no doubt, an injustice, because the separated bones, no matter how much traction is made by the orbicularis oris muscle in moving them together, will remain separated to the end of life.

If the cleft of the palate is single and if the lip is closed, the long segment of bone will protrude far beyond the short segment and the edges of the alveolar processes will not meet, except in rare cases. In nearly all cases treated in this manner, there is an opening between the mouth and nose where no attempt at union has been made. To so operate is similar to closing a wound over a fracture and allowing the fracture to go without a splint. It is unnecessary to state that no surgeon would operate without adjusting the fragments and immobilizing them in the doing of this operation. Cleft palate surgery, when the palate is completely separated, is *always* bone surgery and the time must come when all will appreciate this fact and practice this course of procedure in order to secure normality. If the surgeon succeeds in getting the lip closed over an extensively protruding premaxillary bone, still the deformity exists within the mouth, though covered up, and the patient will have a monkey-face so long as he lives.

*Read before the Southern Minnesota Medical Association, Mankato, November, 1920.
Reprinted by permission from Minnesota Medicine, May, 1921.

When well understood, I regard the moving of the bones into proximity as one of the most satisfactory operations in surgery. Men who are not familiar with this work and who have not followed the hospital records, have claimed that the mortality is very high. Out of 577 patients under one year operated during the past five years, for the approximation of the maxillary bones and the carrying of the premaxillary bones into proper position, I have lost 16 patients. I attribute the low mortality of 2.77 per cent in these cases to the fact that shock is less severe following an operation at this age than it would be between 12 and 18 months, and further to the fact that I will not operate upon any patient unless he is in satisfactory condition. Patients of this age must be in

Fig. 1.—The monkey-face. This child had protruding premaxillary bones. An effort was made to close the lip over them, with the result illustrated. The boy could not close the lip except with the greatest difficulty. His mouth was constantly open. The deformity following operation was nearly as great as the one which the surgeon undertook to correct.

the hospital under observation not less than 3 days, have a physical examination and must be gaining in weight.

A study of the thymus gland is of great importance. We know that status thymico-lymphaticus is a serious menace to surgical procedure in young children. I do not regard the surgical risk as great in infants under 5 months as between 6 months and 3 years. In December 1919 I lost a patient 18 months old, following an operation. The patient had been prepared as usual. He was large and vigorous. The child died suddenly. The autopsy revealed an enlarged thymus gland and status lymphaticus. As a precaution against such unfortu-

nate events I have adopted as a routine measure the making of a radiograph of the child's chest so as to determine whether the thymus is of normal size. Percussion will fairly well outline the borders of the gland, but the x-ray is conclusive. If the gland is enlarged, operation should be deferred. Often one treatment of x-ray will be sufficient to reduce the gland to normal size, after which the operation may be made, usually within 6 weeks.

Acidosis is responsible for many ailments. An examination of the urine should be, of course, included in the physical examination, but it is always well to anticipate acidosis and make use of sodium bicarbonate in small doses frequently given, for several days before operation. A dram may be dis-

Fig. 2.—Profile of same child, showing the extreme prominence of the lip, due to a misconception of the proper treatment of the protruding premaxillary bones. The surgeon did not realize that the protruding premaxillæ called for bone surgery, which should always be the first step in correcting the deformity.

solved in one-half pint of water and a teaspoonful given to young infants every two hours. We irrigate the mouth and spray the nose with a solution of boracic acid.

Formerly it was my custom to operate in the morning, the patient being allowed no food. More recently it has been my practice to give children a half ration breakfast at about 5:30 a. m., operating at 9:30. I believe that the food received at this time is of great advantage in giving the child strength and better fitting him for the anesthetic.

The anesthetic used is ether, although I prefer chloroform. But the

general objection to chloroform and the difficulty in having it administered properly has led me to use ether exclusively. I would like to say in this connection that chloroform, properly administered, is, in my opinion, the best anesthetic known. Medical teaching in this country is, however, against it. In fact, our medical institutions do not teach its use and it would not be fair to a patient to have an anesthetic administered that is not understood. In my experience in France during the war, I never saw any other anesthetic than chloroform administered in the French and English hospitals.

In 1885, having become familiar with the methods employed generally by surgeons throughout the world and having studied the deformity from every

Fig. 3.—The protruding premaxillary bones in this child were moved back into their correct position by making an oblique incision through the vomer. The edges were freshened, as well as the edges of the maxillary bones. Two strong wires were carried through the maxillary bones, and anterior to the premaxillary bones beneath the maxillary periosteum. These bones were firmly immobilized. The soft parts over the freshened surfaces of the bones were sutured with horse hair. Fifteen months later, the imperfections of the lip were removed, the vermillion border corrected, and the dilated nostrils were normal. From the ugly appearance that he presented in Fig. 1, we have in Fig. 3 a handsome boy.

point of view, I concluded that the time best suited to close a cleft palate was as early after birth as it was possible to operate. The basis of my belief was that a cleft might be closed by a little pressure immediately after birth, whereas six months later the bones would be so ossified that the moving of them together would be attended with difficulty and, besides, the results of the work would not be as satisfactory. A cleft palate is a fissure, a separation, nearly always of well developed parts, not (with few exceptions) the

result of *arrested development*, nor failure of the normal quantity of tissue to enter into its structure. It is practically a wound. I hold, therefore, that it *should be closed in early infancy when it can be accomplished most easily*. Our text books and professors of surgery, with few exceptions, teach, if they teach it at all, that congenital harelip should be operated upon in early infancy and that no attempt should be made to close a cleft palate until the child is several years old. The practice and teachings of surgeons of highest repute have led medical men, in some instances, to advise those seeking information as to the most desirable time to operate for harelip and cleft palate, to have the lip operation performed at once and to postpone the palate operation until the child

Fig. 4.—Here we have a profile showing the great improvement made in this lad by moving the bones into proper position and correcting the lip.

is from 3 to 10 years old. I have endeavored not only to overcome the objections raised to early operations, but also to avoid difficulties with which the older surgeons contended. *After 35 years of study and clinical experience, I am satisfied that the most desirable time for operating upon cleft palate is within three months after birth. At that time we are able to secure more satisfactory results than in later life and we also avoid the objections usually raised by surgical writers.*

Within the past four years I have ventured to approximate the bones that were widely separated, with protruding premaxillary bones, in patients beyond infancy. A patient 5 years old who came to me, with extensively protruding

premaxillary bones and a complete cleft, was treated by moving the bones backward and approximating them, afterwards closing the lip. A child of 14 months who came into my practice about 2 years ago, had an extensive cleft of the palate in the median line. There was a complete separation of the premaxillary bones, leaving a central incisor tooth on each side of the fissure. The upper arch was so broad that the teeth of the lower arch were completely telescoped by the upper, the lower teeth coming in contact with the mucosa covering the hard palate. This was indeed a problem. I resolved to approximate the bones. I carried 6 strong silver wire sutures through the maxillary bones, using 2 heavy lead plates (No. 13 American gauge), each

Fig. 5.—Extensive protrusion of premaxillary bones, double harelip, and cleft of the palate.

perforated with 3 holes admitting 2 wires through each hole. These wires were brought together and twisted. As much force was used as I thought advisable, and I could see a slight moving of the bones under pressure. Ten days later, the patient was again anesthetized, the slack taken out of the wires and they were twisted again. So, by twisting the wires about every 10 days or 2 weeks, extending over a period of 3½ months, I was enabled to bring the bones into proximity.

I am now convinced that any patient up to 15 or 20 years may have these broadly separated bones approximated if the surgeon will take time enough, by moving them little by little and from time to time. We know that the

orthodontist is able, by moving teeth slowly, to bring them into almost any position desired. The same is true of bone. In fact, bone having in it a large amount of cancellated tissue, is far more easily moved than teeth.

Nevertheless, in the light of surgical advancement and development of modern methods of procedure, *no cleft palate patient should be permitted to attain an age when speech is attempted without having an operation performed and the defect removed.* Students must no longer be taught methods which should be obsolete in this field of surgery; they must not permit the deformity to remain without attention; they must qualify themselves in modern methods

Fig. 6. Interior of mouth, showing protrusion of bones, double harelip, and cleft palate. A pulpless, loose tooth is visible. This was removed before the first operation.

in this special surgical work as they do in other departments of surgery. Having, then, in mind the anatomical defects of the palate, they should seek to overcome them, *bring the abnormal anatomical parts in normality and thus establish more perfect functional results.*

The second object of palatal surgery is correct function. We cannot secure function unless we secure a good palate—a palate long enough to pass backward to the postpharyngeal wall; the posterior palate must be safe, flexible and resilient. Such a palate cannot be secured when large lateral incisions with a view to relieving tension are made in its structure. The Langenbeck incisions should not be made. They are unnecessary. There are nine reasons why these

incisions should not be made and not *one* good one why they should be made. With lead plates, wire tension sutures and horsehair coaptation sutures, a good palate may be made. When the palate fails to unite, it is due usually to a failure in the operation. If the palate is raised back as far as the styloid process of the temporal bone and hamular process of the sphenoid bone, it will be redundant. When denuded from the hard palate it will drop down and the edges meet without tension. After adults and younger persons have been operated, they often think they should speak perfectly at once. It will be quite impossible, in the time at my command, to enter upon a description of the methods

Fig. 7.—Premaxillary bones brought into correct position, the edges freshened in both premaxillary and maxillary bones, perfectly immobilized by wiring them in place.

employed in training a patient, who has been operated after defective speech habits have been acquired, to speak well.

The study of eugenics is intensely interesting, and points unerringly to the inheritance of congenital defects. In a communication recently received from Dr. Chas. B. Davenport, Director of the Eugenics Record Office, Cold Springs Harbor, Long Island, New York, he says:

“Of the 2,500,000 men examined (for army service), including 500,000 rejected, there were recorded 1183 cases of cleft palate and 283 of harelip.” It would be impossible to enumerate all the states where statistics have been gathered. I give only a few.

State	Cases	per M
Vermont	13	1.55
Maine	29	1.49
North Dakota	18	1.01
Illinois	68	.38
Arkansas	7	.16

"The defect is commonest in agricultural sections of the north, 0.88 per M.; in negro sections, 0.35 per M.; in mountain sections, 0.59 per M., and in desert sections, 0.33 per M."

In considering these figures regarding the frequency of cleft palate, we

Fig. 8.—Profile of boy after the premaxillary bones were united to the maxillary bones.

must remember that those included were young men undergoing examination for the army, between the ages of 21 and 32 and we do not take into account the enormous group from early infancy to 21. It is only fair to estimate that a far greater number of cleft palates are under the age of 21 than over. Christopher Heath, the English surgeon, made the statement many years ago that nearly 50 per cent of cleft palate infants died of starvation since they could not perform the function of deglutition. This being the case, instead of there being 1183 cases of cleft palate in the United States, there would be many, many times that number.

It is well understood that complicated, tripartite cleft palate, with harelip, is the most conspicuous deformity known to mankind, and realizing the fact

that this deformity is the least understood and the most unsatisfactorily treated in the whole field of surgery, we seek for a reason. There is one, which must be apparent to every observing surgeon. In 1915 I requested my publishers, P. Blakiston's Son & Company, to write to the leading medical colleges of the U. S. and ask the following questions: "Have you a Professor of Oral Surgery?" and "How many lecture hours per year and how many clinical hours in Oral Surgery are given?" Out of 64 replies, 6 were in the affirmative as to having a chair of oral surgery. This accounts for the apathy on the part of medical practitioners generally, in regard to this subject, since they have not, as medical students, had an opportunity to learn.

Fig. 9.—Front view, showing double harelip and broadly flattened nose, the breadth being greater than the length.

I was recently asked by a distinguished educator, not a physician, what I thought was most needed in the department of medicine. I said to him, "Doctor, my answer is very plain. What the medical student most needs, in my opinion, is to learn how to take care of his patients." So long as only 6 out of 64 of our foremost medical colleges have in them chairs of oral surgery; so long as the interns, who are among the best men from our colleges, have no knowledge of the work we are here discussing, we can expect only such disastrous results as have been exhibited here today, in many cases, instead of having these deformities treated with the same knowledge, the

same care and the same skill as we get in the treatment of other ailments and deformities of mankind. I do not wish to charge the young practitioner with negligence in this work because I know that if an opportunity had been placed before him and if he had been required to pursue these studies, he would at least recognize and follow a practice that would not leave the patients, as we sometimes see, in a worse condition than they were before they were operated.

Higher medical education—increasing the requirements for admission and for premedical training, increasing the facilities for laboratory work, strength-

FIG. 10.—Nose lifted, after the lip was closed.

ening the faculties by bringing in men who have been thoroughly trained in their respective departments—has advanced most satisfactorily during the past decade, but the clinical facilities have not kept pace; postgraduate work, while not up to the highest standard, has done much to aid the practitioner in the care of his patient. Why should oral surgery not be included?

It must be apparent to all that the greatest obstacle in the way of success in the field of oral surgery, and I might say oral pathology and surgery, lies in the fact that, as I have pointed out, there is failure on the part of medical colleges to teach thoroughly these important subjects. The many mistakes made in this field must cease; deformed humanity is entitled to better surgical results.

Dr. Chas. Mayo said in Chicago some years ago when addressing the Chicago Dental Society, "The next great move in preventive medicine will be accomplished by the dentists of our country. Will you do it?" To do it calls for a thorough training not only in dental histology, physiology, anatomy and pathology, but they must do more than this. They must have a thorough training in general pathology and antiseptic surgery.

Fig. 11.—Construction of palate, lip and nose completed. It will be seen that the nose in Fig. 9 is nearly twice as broad as in Fig. 11.

When the dental colleges of our country come up to this high standard suggested by Doctor Mayo; when the medical institutions demand as a part of the curriculum a training as thorough in oral pathology and surgery as they do in the departments of the eye, ear, nose, throat and cutaneous diseases, et cetera,—then, the innumerable errors now committed in the management of harelip and cleft palate will end.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

DENTAL STEREOROENTGENOGRAPHY

BY C. A. LEMASTER, D.D.S., ST. LOUIS, MO.

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THE application of the principle of stereoscopy to roentgenology is not novel; it is employed with success, good, poor and indifferent. Its value has been grossly underestimated by some and correspondingly exaggerated by others. The indisputable fact remains, that a simple roentgenogram (radiogram) is a flat record of superimposed shadows while a stereoroentgenogram is a record of those same shadows arranged in their proper perspective planes. From which it follows that stereoroentgenography may be used with great advantage wherever the subject for examination calls for differentiation of structures lying in various planes or depth. Keeping this last idea in mind, namely, the differentiation of structures lying in various planes or depth, we can readily see that examinations of this character are of great value to the orthodontist and exodontist especially, for their work requires the most thorough and accurate knowledge of all of the structures of the oral cavity, especially the relation of one tooth to another, its position in the arch, and its proximity to the adjoining teeth and structures.

Singularly enough, stereoroentgenography has been employed very little in its application of dental roentgenology (radiodontia). Extraoral stereos have been made for some time with success, but we all know the value of the intraoral roentgenogram over the extraoral kind for the average dental conditions; the technical difficulties in making two successive exposures with the film placed each time in accurately the same position within the mouth, the slightest motion by the patient between exposures, the accuracy of the central ray, the shift of the tube and stand, the difficulty of viewing, as some individuals cannot view stereoscopically, and the accuracy in mounting the finished roentgenogram all may partially account for this. Also the lack of apprecia-

tion of many dentists of the additional information which may be secured by its aid.

The purpose of this brief article is not to deal with matters pertaining to technic; rather it is the desire of the writer to illustrate and emphasize the benefits which may be obtained from a judicious use of the principle of perspective in dental roentgenology.

Even at the risk of inviting protestation and argument to the contrary, it must be stated with emphasis that the application of one of the most fundamental of everyday optical laws in the study of a roentgenogram will often prove deceptive and misleading. From infancy on we are wont to associate things we see clearly and distinctly with nearness, those we see more faintly with greater distance. This is scarcely a matter of reasoning—it is a matter of instinct born with experience. Yet to arrive at a similar conclusion, in the interpretation of a roentgenogram will prove faulty as often as not. Why? Because distance plays no particular rôle there, generally speaking. If an unerupted cuspid shows clearer and more distinctly than a deciduous one it is no indication that it lies nearer to the film, that is lingually, than the deciduous one. It only means that its specific gravity is greater, that it offered greater resistance to the passage of the roentgen rays, that its outline appears more sharply marked because it is more sharply outlined. And yet how often are these findings misinterpreted. Another instance might help to illustrate: A broken off piece of steel broach slipped down between the side of the tooth and the process. Three out of four who examine such a roentgenogram will immediately arrive at the conclusion that the broach lies closer to the film—lingually, than the tooth. Why? Because it shows denser and more sharply outlined; because they invoke the almost instinctive association of things clearly visible with things near. And they may be right and again they may be wrong. Purely a matter of luck; luck is all very well, to be sure—but to have one's gums explored just on luck! The truth of the matter is that this piece of broach would appear the same on a roentgenogram, if it was on the buccal, labial or lingual surface of the tooth. Only two means exist which will avoid such errors; a number of roentgenograms may be made, from different angles, possibly at right angles to each other, or by means of stereoroentgenography. The latter has the advantage of speed, convenience, and superiority of results since it is often quite difficult to secure right angle roentgenograms within the mouth due to the superimposition of the teeth and bony structures and the heavy bony plates of the skull.

Briefly there are three groups of examinations where flat pictures are usually unreliable:

1. Localization of foreign bodies,
2. Orthodontic cases,
3. Exodontia cases,

and we might include the definite localization of periapical destruction.

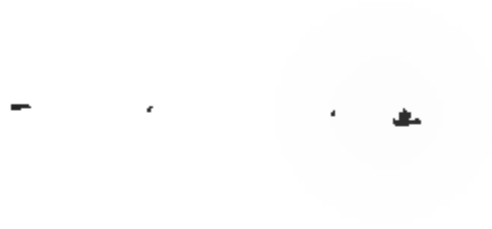


Fig. 1.—Dried specimen



Fig. 2 —Dried specimen. Stereoroentgenograms. View stereoscopically *

*To view prints cut out the print and mount on a card board and view through hand stereoscope.

Fig. 3.—Actual case. Upper teeth. Stereoroentgenogram.

Fig. 4.—Actual case. Upper teeth. Stereoroentgenogram.

Fig. 5. Actual case. Upper teeth. Stereoroentgenogram

Fig. 6.—Actual case. Upper teeth Stereoroentgenogram.

Fig. 7.—Actual case. Lower teeth. Stereoroentgenogram.

Fig. 8.—Dried specimen. Lower teeth Buccal aspect stereoroentgenograms.

Fig. 9.—Dried specimen. Upper teeth. Stereoroentgenogram.

Fig. 10. Dried specimen. Upper teeth. Stereoroentgenogram.

Fig. 11 —Dried specimen. Upper teeth. Stereoroentgenogram.

1. LOCALIZATION OF FOREIGN BODIES

As mentioned before the usual methods of localization cannot as a rule be used when localizing a foreign body in or around the teeth, this especially is true in the upper maxilla, jaw. In the mandible, occlusal bite roentgenograms can be easily made and then a right angle roentgenogram made with the film held against the process, regular intraoral method. However, in the maxilla, upper jaw, it is different, especially if the upper anterior teeth protrude and an unerupted tooth or foreign substance is to be localized in this area, which necessitates making the exposure through the thickest part of the skull to obtain a *true* occlusal roentgenogram. A roentgenogram of this type will show the displacement of the foreign body in relation to its being lingual, buccal, or labial to the teeth, but the average exposure in a case as described above is usually prohibitive. Fig. 1 shows the upper occlusal method of localization. Fig. 2 of same case, dried specimen, Stereoroentgenograms. Fig. 1 simply gives the displacement or relation of the unerupted teeth in their lingual position, does not give its relation to the surrounding structures or its long axis position in the process. Fig. 2 which can be viewed stereoscopically, gives the position of the unerupted right upper cuspid, viewed from the lingual aspect, lingually to erupted teeth, also its relative position to the surrounding teeth can be noted, a definite idea as to its line of eruption, in fact one can *see* its *position*. As further example, might be mentioned the following case: During the injection for nerve blocking the tip of the hypodermic needle broke. A preliminary roentgenogram showed it supposedly lying superimposed to the upper right second molar, third molar missing. It may be added that as always the needle appeared lingually, though in this case it was known to lie buccally. Further stereoroentgenograms disclosed the needle considerably posterior to the second molar, as well as superior and sharply inclined; the point of the needle lies upwards, whereas the proximal end was only a little removed from the surface of the gums. Exploration based on flat roentgenograms proved unsuccessful; after correction by means of perspective, stereoroentgenograms, the needle was removed without more than ordinary difficulties.

2. ORTHODONTIA

In this branch of our profession the utmost care is necessary to absolutely know one's field before commencing upon a case, if there is anything that will give the orthodontist a clearer and more comprehensive idea of the case in hand than the method of stereoroentgenography, I would be very happy to obtain this method. All of the illustrations in this article are true stereoroentgenograms. This will suffice in explaining the value of this method to the orthodontist as these prints are mounted to be viewed stereoscopically. Use a small hand stereoscope; cut out the prints, mount upon a piece of cardboard, and hold so that the reflected light will fall upon the face of the print.

3. EXODONTIA

Stereoroentgenograms are of practical value in localizing the tooth to be extracted; just as the medical surgeon wants foreign objects localized before the operation, so the exodontist who wishes to remove the tooth or teeth with as little trauma as possible wishes to have the object to be removed, before his eyes, if it can be done. Just view the prints.

Fig. 3, lingual aspect view, left upper central incisor, unerupted and situated lingually to erupted teeth, tooth is rotated.

Fig. 4, lingual aspect view, left upper cuspid, unerupted, lingual to anterior teeth, apex of root superior and buccal to apex of second bicuspid.

Fig. 5, lingual aspect view, cuspids upper right and left side, unerupted, lingual to anterior teeth.

Fig. 6, lingual aspect view, upper anterior teeth. Left upper lateral incisor area. Large area of the process destroyed; shows definite area of destruction between central incisors communicating with the larger area in the lateral incisor process; cuspid and first bicuspid involved.

Fig. 7, lingual aspect view. Lower anterior teeth. Left cuspid shown unerupted, misplaced lingually, far removed from the erupted teeth.

Fig. 8, dried specimen, buccal aspect view, that is, viewing from the buccal surface instead of from the lingual surface. Taken to determine position of the needle. Is it buccal, lingual or where to the left lower molar? View the stereoroentgenograms and you will know.

Fig. 9, dried specimen, lingual aspect view. Cuspid viewed stereoscopically, which shows it to be far removed lingually from the erupted teeth; it appears towards the person viewing, which is actually true, as I glued the cuspid to the palate before making the exposures.

Fig. 10, dried specimen, lingual aspect view. Same case as above, duplicate pictures improperly mounted. This gives the viewer a pseudostereoscopic view, the cuspid now appears to lie on the labial surface of arch. This is shown simply to illustrate what improper mounting does. Every true stereoroentgenogram should do this.

Fig. 11, dried specimen, lingual aspect view, upper anterior teeth, shows left upper cuspid displaced labially, far removed from the erupted teeth. This tooth was glued to place on the labial surface before making the exposures.

These few examples selected at random should offer proof of the statement made: That stereoroentgenography as applied to dental roentgenology is of unquestionable value wherever the peculiarities of the case demand accuracy in the differentiation between the various planes in which the structures to be studied come to lie. That little or no valid excuse may be found for the apparent neglect of dental roentgenologists in employing this important branch of their specialty, unless it be the general lack of demand for it. If so, may we not justly consider it as part of our duty in familiarizing the dentist with the vast benefits he is sure to derive from the judicious use of the additional value which perspective adds or lends to the roentgenogram.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Presence of Teeth at Birth. H. T. Fauconnier. *Revue Belge de Stomatologie*, 1920, xviii, No. 8, p. 334.

This observation upon a female child born in June of 1920 is reported as a curiosity. A wax plate was obtained on the eighteenth day, and showed the two lower central incisors half emerged from the alveolar border. The two teeth were healthy but were rotated in such a way as to encroach upon each other, their incisor margins being directed obliquely from before backwards and from right to left. This child has eight brothers and sisters none of whom possessed teeth at the time of birth. This dental eruption during intrauterine life, although not altogether exceptional, is nevertheless quite uncommon. It is claimed by some observers, however, but without proofs in support of their statement, that this occurrence is more frequent than is generally believed. Both anatomists and accoucheurs have reported the presence of teeth at birth. Testut writes that children have been born possessing one or several teeth, but that these cases are very exceptional. Some observations of this kind are historical: Richard III, Louis XIV, Mazarin, Mirabeau, were born with teeth. The rarity of this phenomenon is illustrated by the fact that the above observation is the only one in a material of 3500 infants seen in the service of Dr. Sagher in Liege, Belgium.

As regards the sequelæ which may result from this abnormal dental eruption these are usually absent, as in the author's observation. Sometimes, however, chronic ulcerations of the infant's tongue may follow, occasionally requiring the extraction of the teeth. More frequently, the resulting disturbances concern the mother, the nipple being bitten by the nursing child and requiring adequate protection by shields or other contrivances.

Modern Orthodontics in General Practice. G. F. Cale-Matthews. *The Dental Record*, 1920, xl, No. 10, p. 621.

In this paper which was read before the Liverpool and District Odontological Society, the author said that in the three years preceding the war, when orthodontics was placed on a recognized basis in the Birmingham School and he took charge of that department, just over five hundred cases passed

through his hands. Today the difficulty is to get cases for the students. It is quite possible for the general practitioner to practice orthodontics in a scientific manner and to be assured of some definite results in the cases taken. Not all classes of cases should be attempted, however, for many exact the utmost skill of the specialist. The restoration of occlusion is the aim of the orthodontist, and the older idea of the regulation of individually misplaced teeth must be discarded. The ideal of orthodontics of today is primarily to correct and to establish occlusion. This establishment of occlusion means beauty of contour, both of the arches and of the face. What an enormous factor in the improvement of facial lines the denture is, only those who have practiced orthodontics will realize. The restoration of the correct occlusion helps to keep the denture clean and healthy. With regard to the age question, the author does not favor treating young children; in his opinion a child of under seven or eight years old is too young to be hampered with appliances in the mouth. The individual teeth are a very minor matter, it is the correction of the relation of the arches which is important. Having once established the relations, the correction of individual teeth is a very simple matter. Apparatus is left to ingenuity and choice of the orthodontist. The lecture was enriched by a screen display of a large number of slides illustrative of orthodontic treatment in cases which had come within the scope of the author's practice.

Mothers' Milk and Better Teeth. Th. T. Ryan. *American Medicine*, 1920, xxvi, p. 646.

The importance of breast feeding from the dental standpoint is emphasized by the author, who maintains that the mother is the only source from which the child's physical and dental equipment can be obtained. If her milk is deficient in any essential qualities, the mother should endeavor to increase and improve the supply by appropriate dietetic measures (milk, chocolate, vegetable oils). Milk provided from any source other than the mother undergoes a chemical change, especially when pasteurized or even heated to a temperature above body heat. Its protein constituents and the mineral salts so necessary to the development of the child's teeth and other body structures, become partly disorganized. Pasteurized milk is not so digestible, the casein being rendered more tough and difficult of digestion; clean raw milk is always a better food than treated milk. The teeth of a baby fed on a milk modification deficient in lime will erupt tardily and irregularly; for teeth require organic phosphates, particularly phosphates of calcium as well as carbonates of lime, more than any other part of the body.

Treatment of Alveolar Fistulas of the Antrum of Highmore. C. F. Welty. *La Odontologia*, 1920, xxix, No. 11, p. 477.

The patient was a man of 35 years of age, who had had a tooth extracted ten years previously. The antrum of Highmore became infected and since that time had suppurated through the fistular orifice of the alveolar margin. Several unsuccessful attempts were made to close the fistular tract. Three days before the

patient came under observation, an acute exacerbation of the antral infection had occurred, he had chills and fever, and felt quite ill, but was in good physical condition. The nose was filled with fetid pus, and the nasal septum was deviated to the right. Neither hypertrophy nor polyps were present. Two teeth had already been extracted at the site of the fistula. Radical operation of the antrum was recommended, as well as correction of the septum and extirpation of the tonsils. The last two conditions were operated upon and healed readily. The antrum of Highmore was very large and nearly filled with polypoid masses and fetid pus. The root of one tooth had not been removed and was impacted in the polypoid mass on the floor of the antrum. Two other exposed and carious roots of the same tooth projected into the cavity. Not much of the alveolar border was left in this locality. The tooth, which obstructed the fistulas opening, was extracted, in the expectation that the surface would become adherent, and the operation was terminated in the usual manner. In the course of three weeks, the antrum became entirely well, but the fistula was larger than ever. A radiogram of the jaw, taken at this time showed that the last tooth which was left on this side had a root abscess and that the part corresponding to the fistula was completely exposed. Although this tooth was cured, the fistula continued to increase in size, without a tendency to heal. It then occurred to the author that a procedure like that for cleft palate was the only way to close the antrum permanently, and he accordingly proceeded as follows: Under general anesthesia, an incision was applied at each end of the fistula on the outer side of the alveolus, passing back to where the bone had been extirpated in the operation on the antrum of Highmore. The periosteum and the mucosa of the alveoli were detached and the entire alveolar margin as far as the antrum of Highmore. A similar incision was applied inwards at each end of the fistula, raising the periosteum and the mucosa from the bone and removing the latter. There remained an opening 3.75 cm. in width, through which the finger could be introduced, penetrating into the antrum of Highmore. An incision was then applied in the median line of the hard palate in its entire length, raising the periosteum over this entire area. It is readily understood that with this procedure, there could be no tension on insertion of the sutures. These could be removed ten days later, and it was found that complete union had occurred. The author has since had a very similar case, in which equally satisfactory results were obtained. Numerous individuals suffering from fistulas of the antrum of Highmore could be easily cured in the manner described above. The author emphasizes, however, that the radical operation must be performed on the antrum of Highmore, preferably with the above modification, and good results must have been obtained, before the last procedure is attempted.

Peripheral Lingual Paralysis Following Gunshot Injury. F. Peyser. *Deutsche Zeitschrift für Chirurgie*, 1920, clviii, 145.

Bilateral peripheral paralysis of the hypoglossus is apparently very rare, although bilateral central paralysis of this nerve is not uncommon, especially in affections of the medulla oblongata, the nuclei of the twelfth pair of cranial

nerves lying so close together that a focus as small as a pea may lead to bilateral paralysis of this nerve. The enormous material of the world-war has contributed also a few cases of bilateral peripheral paralysis of the hypoglossus. The authors' personal observation concerned a soldier thirty years of age, who was struck by an aviator's bomb, the entrance-orifice being a thumb's width to the right of the chin, directly above the free border of the lower jaw. The exit-orifice was situated close behind the left angle of the lower jaw. Judging from the size of the orifices, the splinter of the projectile must have been about the size of a cherry. The lower jaw was found to be fractured close to the mental portion on the right side, and in the anterior third of the horizontal ramus on the left side. The tongue was badly swollen and hung entirely motionless out of the patient's mouth. He had to be nourished by means of a rubber tube which was pushed far into the pharynx. Speech was altogether lost, and respiration was extremely difficult. At first there was profuse salivation which gradually improved somewhat. Two months later, he began to speak and after seven months was able to speak fairly well, although slowly and with difficulty. The left mandibular fracture healed spontaneously in good position, whereas, on the right side a pseudarthrosis of the lower jaw developed, which required correction by means of free bone-plastics from the pelvic crest. The tongue gradually became retracted into the buccal cavity in the course of three months, but it remained completely paralyzed. Fifteen months later, the tongue lay motionless and flaccid on the floor of the mouth, with its left side much more voluminous than the right side, which was markedly atrophic from the tip to the root of the tongue.

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Sublingual Ranula. C. D. Avellanal. (Buenos Aires). *Revista Dental*, 1920, xiii, No. 10, p. 302.

There are three varieties of this disease: ranula of the newborn; common or sublingual ranula; and suprahyoid ranula. The first variety is extremely rare and usually due to an occlusion of Wharton's duct. Simple incision of the swelling permits the passage of the saliva, and the ranula disappears. Sublingual ranula begins isidiously and the bearer notices accidentally the presence of a tumor. When fully developed, sublingual ranula is often sharply circumscribed, but sometimes passes beyond the median line, the tumor then taking a bilobular form. In size it varies from the volume of a nut to that of a hen's egg. The tumor is round, bluish-white in color, fluctuating, and completely reducible by pressure when a communicating suprahyoid sac is present. It is painless, but sometimes it acquires such a large size as to push the tongue backward and upward, thereby giving rise to disturbances of swallowing and speech. Under these conditions the tumor may rupture, and a spontaneous cure may result; as a rule the opening closes and the ranula heals. In certain exceptional cases, the ranula may become inflamed and undergo suppuration. Ranulas are distinguished from other cystic tumors of the floor of the mouth by their shape, transparency, fluctuation, and especially by exploratory puncture, which permits the escape of clear viscid fluid.

It differs from a lipoma of the floor of the mouth, which is less superficial, of pasty consistence, and not fluctuating; from a lymphangioma, which appears in the newborn, spreads rapidly, and forms a regular distinctly outlined tumor. The prognosis is not serious, but recurrences are common. As to treatment, puncture followed by injection of curative fluids is insufficient, the ranula returning in the majority of the cases. Incision and cauterization are likewise followed by very frequent recurrences. Removal of the protruding portion of the cystic pouch is not always sufficient. It is necessary to extirpate the entire ranula and to make the excision sufficiently deep and extensive, for the germs of recurrences are found in this region. Uncomplicated suprahoid ranulas can be extracted by the cutaneous route.

Paradental Cyst of the Mandible in a Child. Coustaing and Crocquefer. *La Revue de Stomatologie*, 1920, xxii, No. 11, p. 648.

The patient, a girl fourteen years of age, was seen in the St. Louis Hospital, with a painless tumor situated in the left lower portion of the face. This swelling did not attract attention until a year ago, when the patient suffered for several consecutive days from toothache. On examination of the face, a deformity was noted in the middle portion of the horizontal ramus of the left mandible, without pain, redness, or heat. In the alveolus of the same side protruded a painless fluctuating tumor, without a change in color of the mucosa, the size of a pigeon's egg, referable to the six years' tooth which was reduced to its infected roots, extending from the first small molar to the twelve years' tooth. The onset of this tumor presumably dated much farther back than the attack of toothache, so that its development had been a very gradual one before the present stage of deformity was reached. This peculiarity, in combination with other signs, contraindicated acute or chronic phlegmasia as well as sarcoma, which has a more rapid course. Moreover, the tumor was fluctuating and the general condition satisfactory. Exploratory puncture removed all doubts, yielding a lemon-colored fluid, so that the diagnosis of cystic tumor was rendered. Treatment consisted in enucleation under local anesthesia (novocain-adrenalin). In the course of the intervention, the cyst-sac was ruptured and a large amount of yellowish fluid escaped. After careful scraping, the bony gap was painted with carbolic acid and packed, tight tampons being left in place during forty-eight hours, to guard against secondary hemorrhage, which occurred in a similar case under the authors' observation, where the packing was omitted. The histologic examination entirely confirmed the clinical diagnosis. The case seemed worthy of reporting, as paradental cysts in children are very uncommon, and especially rare in the lower jaw.

Gas-oxygen Anesthesia in Relation to Major Dental Surgery. E. I. McKesson, Ohio State Dental Association, November 30th, 1920.

The conclusions arrived at by the author concerning anesthesia in dentistry are as follows: (1) Gas-oxygen anesthesia is applicable to all operations for any patient. (2) Deep anesthesia may be obtained by secondary saturation,

which more completely fills the blood and tissues than was heretofore thought possible. (3) Secondary saturation consists of procedures, *first*, displacing as much of the oxygen and nitrogen as possible with nitrous oxide, resulting in spasticity and, *second* following this immediately by enough oxygen only to restore normal anesthesia with flaccid muscles. (4) The true signs of anesthesia are muscular phenomena.

For several years the author has resorted to secondary saturation in the management of obstreperous patients, and he has found none which could not be anesthetized with gas-oxygen. Every patient may be anesthetized whether he is an alcoholic, morphine habitué, or an athlete, but the difficult cases require greater nitrous saturation and it takes a minute or two more time to induce narcosis. However, after anesthesia is established it may be continued indefinitely, permitting the surgeon all the time he requires for impacted third molars, alveolectomy, and other prolonged operations.

Oral Sepsis and Its Radiographic Diagnosis. T. H. Woodroffe. *Archives of Radiology and Electrotherapy*, 1920, No. 245, p. 217.

A series of dental radiograms is now regarded as an indispensable preliminary to treatment, by a large number of dentists and physicians, when faced by a case of suspected oral sepsis. As a rule, septic infection about the teeth occurs in one of two ways: Either it is a lesion which has commenced in the periapical regions of the tooth, due to infection following death of the pulp, or the lesion has started at the gingival margin and is independent of pulp vitality. In those cases where the gum margin has been the first to be affected, pyorrhea alveolaris results. In the earliest stages, the soft tissues of the gum are alone involved, but before long infection spreads to the periodontal membrane, along which it progresses towards the apex of the tooth. The bone surrounding the tooth becomes infected, and is gradually destroyed from alveolar margin to apex, until finally the tooth may have lost all its bony support. As regards the radiographic appearances caused by pyorrhea, no signs of disease are visible in the first stage, where only soft tissues are involved, although occasionally the unhealthy state of the gingival margin may be indicated by concretions of tartar. The spread of the disease to the periodontal membrane, which very shortly occurs, will be indicated by a thickening of the light periodontal line. From this it is a very short step to involvement of the interdental bone, and in the radiographic print this is shown by the absence of the apices of the interdental spines. The further course of the disease is shown radiographically by progressive absorption of bone extending upwards from the alveolar margin towards the apex, until finally the teeth appear to have little or no bony support. Pyorrhea alveolaris is most commonly seen in connection with the incisor and canine teeth, but a similar condition is often present in connection with the molars and premolars, most frequently under overhanging crowns, projecting fillings, etc. Such cases as these are frequently overlooked. There is no doubt that the only method by which the dentist or physician can positively exclude the possibility of oral toxemia is by radiographic examination of the teeth.

The appearances are distinctive and in the case of periapical disease, the various stages of infection can be distinguished as follows: In the first stage of chronic periapical disease there appears a slight thickening of the light periodontal line, normally to be seen between the apex of the tooth itself and the surrounding bone. This is spoken of as a local periodontitis. At a later stage the bone surrounding the tooth becomes encroached upon, and its rarefaction and replacement by granulation tissue is shown as a more or less light area in the region of the apex of the tooth. An increase of this light area, with a diminution of the detail of bony structure visible, indicates the existence of a granuloma. In cases of rarefying osteitis with suppuration, a white or nearly white area is seen in the print, into which area the root of the affected tooth projects, the latter being frequently roughened and irregular. With suppuration, the margins of the light area are usually irregular and ill-defined, but if the granuloma has undergone a cystic degeneration, as sometimes occurs, the margins of the light area will be seen to be more sharply outlined, and traces of the wall of the cyst may be made out.

Radiographic examination may also reveal the existence of impacted teeth which are apt to have a very unfavorable effect on the general health, a cure of numerous reflex disorders due to impaction resulting from the extraction of misplaced molars. Recourse to radiographic evidence as to the condition of the teeth should be had in all cases of anemia, digestive disorder, iritis, intractable furunculosis, nervous disorders of obscure origin, in fact in all cases which experience has shown to be related to oral sepsis and mouth infections, now known to be responsible for a large proportion of serious constitutional disorders.

The Place of Radiography in Dental Practice. H. Round, *Hettinger's Dental News*, 1921, iv, No. 1, p. 6. (*British Dental Journal*).

Radiography in orthodontics can prove of distinct help through localizing the original position of the teeth before treatment is commenced, and as progress is made, watching the position of the roots during movement and the amount of disturbance of the surrounding tissues. The pictures provide the necessary guidance for the regulation of the moving force. Radiography is also extremely useful for the localization of unerupted teeth. Just as the radiograph has given great surprises in bridge work, so it may even be found, if similar and thorough investigation be made in the field of orthodontics, especially where much time has been spent in moving practically all the teeth in the mouth, that such teeth after so great an amount of disturbance never recover their normal relationship to surrounding tissues, and that the loss of so vital a relationship may eventually lead to serious trouble. In jaw surgery, radiography serves to determine the amount of bone to be removed, to watch the progress after bone-grafting, to localize sequestra, etc. In diseases of the jaws, tumors, fractures, or other injuries, radiography is of value, and the same is true for antral investigation. In cases of pyorrhea, good radiograms are helpful in determining the amount of alveolar destruction and the condition of roots. If crown and bridge work is contemplated, all roots to

be crowned or used as supports should be x-rayed. Radiography is also valuable for the localization of buried roots, unerupted teeth, and especially helpful in extraction of all wisdom teeth. Although it is not necessary, or at all desirable for the dentist to become an expert in all branches of radiography, it is comparatively easy for him to take films, which are of enormous assistance to him in his daily practice. It is only within recent years that the help of radiography has been utilized to any appreciable extent for service in dental work, but the radiograph does not yet receive the respect or the attention it deserves.

Roentgen Therapy in Dentistry. E. Knoche. *Zahnärztliche Rundschau*, 1920, xxix, No. 38, p. 445.

In the treatment of periapical processes through x-ray radiation, a preliminary condition for a successful outcome is the removal of the cause which has led to the formation of granulations. Accordingly, a careful treatment of the roots must precede the radiation, and before or after it, the roots must be unobjectionably filled, for the avoidance of reinfection, in all those cases where a gangrenous pulp has caused the process. When a foreign body, for example a nerve-needle pushed through the foramen, or a fractured root-segment, is responsible, its removal is naturally indicated. Calcium concretions deposited on the root likewise act as foreign bodies. Marginal inflammations, including so-called pyorrhea alveolaris, are not adapted to x-ray treatment, in the author's opinion, as they will heal of their own accord on removal of the cause. An exception is represented by the saccular form of pyorrhea extending deeply along individual teeth, where the loose granulations cannot be removed with instruments unless the mucosa is incised and turned back. This surgical procedure is usually indicated for the removal of the incrustations. In the single case in which the author tried x-ray therapeutic measures, bloody intervention was finally required. As a result of radiation, especially in cases which have recently passed through the suppurative stage, a considerable increase of secretion usually follows. Such recent cases therefore react at first by increased inflammation and pain, unless the usually purulent secretion is drained through a fistula. This naturally applies even more to the suppurative stage itself. Under the influence of radiation, a roentgenographically demonstrable new formation of bone occurs by way of the margin of the focus, leading in a few months, according to the extend of the disintegration, to complete interspersing with new bone. At first the control films still show a somewhat less dense spongiosa in the domain of the old focus, but it gradually adjusts itself entirely to its surroundings. The clinical course is such that existing fistulas close at the end of about a fortnight, after a temporarily increased secretion. Periosteal swellings subside when present, and enlarged regional lymph glands disappear even when not directly exposed to the rays. The subjective manifestations, in the form of tenderness on pressure for percussion, etc., disappear after about three weeks. When the rays have to be passed through the external skin, an associated phenomena is sometimes observed in the form of transitory epilation (loss of hair); pigmentation was also noted in one instance, disappearing without a trace after

six weeks. The radiation should therefore be applied as directly as possible to the alveolar process, and when the topographical relations do not permit a protection of the epidermis, the patient should be prepared as to the possible sequelæ. In the author's experience, the majority when asked to choose between radiation and operation, invariably prefer the former. No permanent damage of any kind was noted, and is not to be anticipated under appropriate technic. Children were excluded from radiation-therapy, in view of the extremely sensitive juvenile epidermis.

The radiation must unconditionally be applied by a trained x-ray therapist. Dentists lack the necessary experience with this highly differentiated agent, so as to exclude damage and ensure success. Moreover, even the larger instrumental equipments, such as are utilized for dental diagnostic purposes, are not sufficient for therapeutic measures. The roentgenologist is responsible for giving the right kind and amount of rays, for taking the proper precautionary measures, and for directing the entire session. He will also instruct the dentist as to the benefit to be obtained from the general radio-therapeutic view-point. The dentist on the other hand has to render the indications and estimate the success of the treatment.

In case a bloody intervention is to be performed in radiated tissues before the end of about two months, for example, an exploratory incision, scrupulous hemostasis must be attended to, for secondary hemorrhages are not uncommon, due to the irritative action of the Roentgen rays. In a general way, it may be said that the domain of x-ray therapy in dentistry is represented at present by the periapical sequelæ of the pulp, in the granulating stage, with or without fistula-formation. As compared with bloody treatment, it offers here all the advantages of conservative procedures, and as compared with purely medical treatment, it means a considerable diminution in the number of necessary sessions. As regards reliability, it can compete with surgical measures, and is superior to medical treatment. In the presence of the external preliminary requirements, and in cases which oppose technical or other difficulties to surgical measures, x-ray radiation will probably become the method of choice.

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EDITORIALS

The American Year Book of Anesthesia and Analgesia 1917-1918*

THE appearance of Volume II of the year book for 1917 and 1918 was delayed by conditions following the World War. This book is a collection of data on anesthesia extending over the two years mentioned. It includes a review of the various papers and clinics presented on the subject. The work has been arranged to cover various topics. Complicating Factors of Anesthesia are represented by seven articles covering 25 pages of text. Following this is Safety Factors in Anesthesia, and we find there an article by Byron R. East, D.D.S., of Detroit, on Oral Hygiene in Relation to Anesthesia, Analgesia and the Anesthetist.

Blood Changes and Circulatory Disturbances is the next topic, under which is a paper dealing with Blood Changes under Nitrous Oxid-Oxygen, by Theo-

*The American Year Book of Anesthesia and Analgesia, 1917-1918. Edited by F. H. McMechan, A.M., M.D., Surgery Publishing Co., New York City.

dore D. Casto, D.D.S, Philadelphia. The dental profession is again represented in a chapter on Experimental Researches and Clinical Observation on Warming Nitrous Oxid-Oxygen for Anesthesia, by Dr. Paul Cassidy, of Cincinnati.

Under the heading of Pharmaco-physio-pathology of General Anesthetics are five articles, one of which is written by Dr. George W. Crile on the Research into the Nature of Nitrous Oxide and Ether Anesthesia, and one by Dr. Cotton on the Cotton Process of Ether Analgesia. Six papers are reviewed dealing with special methods of administering anesthesia, one of which is on the Nasal Administration of Nitrous Oxid-Oxygen Anesthesia under Low Pressure, by M. Ecker, D.D.S., New York.

Anesthesia at the Front and Anesthesia in War Surgery is covered by nineteen writers, eleven of which are from the Allies.

Local anesthesia is given much space which is divided into the Pharmaco-physio-pathology of Local Anesthetics, Local Anesthesia in General Surgery, Local Anesthesia in the Specialties, and Local Anesthesia in Dental and Oral Surgery. Dentistry and Oral Surgery is featured by being the one specialty given a special topic.

The book contains an index covering the current literature on anesthesia for 1917 and 1918.

We can conceive of no book that would be more valuable or contain more information relative to modern methods and use of anesthetics than the year book of 1917 and 1918. It is to be hoped that the next volumes will make their appearance at an early date so that the information contained therein will be available to the professions.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Preliminary Program of the Section of Orthodontia and Periodontia of the National Dental Association, Milwaukee, Wisconsin, Aug. 16, 17, 18 and 19, 1921

Officers of the Section

Paul R. Stillman, Chairman,53 Vanderbilt Ave., New York, N. Y.
W. C. Fisher, Vice Chairman, 501 Fifth Ave., New York, N. Y.
John Oppie McCall, Secretary,360 Linwood Ave., Buffalo, N. Y.

Tuesday Afternoon, Aug. 16, 2 p. m.

Chairman's Address.

Paul R. Stillman, New York, N. Y.

Dento-Facial Deformities.

By B. E. Lischer, St. Louis, Mo.

A Further Study in Compensatory Treatment
for Missing Teeth.

By B. Frank Gray, San Francisco, Cal.

A General Purpose of Orthodontia Appliance.

By W. J. Brady, Kansas City, Mo.

Wednesday Morning, 9 a.m.

The Making of Diagnosis and Prognosis of
Periodental Lesions.

By Elmer S. Best, Minneapolis, Minn.

Some of the Essentials in the Treatment and
Subsequent Care of the Investing
Structures of the Teeth Beyond the
Preventive Stage.

By Elbert J. Weaver, Milwaukee, Wis.

Subject to be Announced Later.

By F. A. Bricker, Rochester, Minn.

Wednesday Afternoon, 2 p. m.

The Field of the Removable Appliances and
the Blending of the Removable and
Fixed Principles.

By Victor Hugo Jackson, New York,
N. Y.

Child Psychology in Orthodontia Practice.

By Geo. F. Burke, Detroit, Mich.

A Treatment of Some Extreme Cases of
Malocclusion and Dento-Facial De-
formities after the Developmental
Period.

By A. C. Rhode, Milwaukee, Wis.

Thursday Morning, 9 a. m.

The Surgical Treatment of Periodontal Le-
sions.

By Justin D. Towner, Memphis, Tenn.

Periodontal Response to Irritation.

By Newton D. Thomas, Oak Park, Ill.

The Use of Monson's Instrument in the Cor-
rection of Traumatic Occlusion.

By Tom Smith, Langdon, N. D.

The Pacific Coast Society of Orthodontists

The meeting of the Pacific Coast Society of Orthodontists, in February, 1921, in Portland, Oregon, was one of the most interesting meetings the Society has ever held, the interest being sustained throughout all the three days' sessions. Dr. Charles C. Mann, of Seattle, was elected president for the ensuing year, while Dr. C. O. Engstrom, of Sacramento, was reelected secretary-treasurer.

Plans are being formulated for the 1922 meeting, which will be held in California, and it is believed a program of great interest will be offered.

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No. 7

ORIGINAL ARTICLES

ETHICAL RELATIONS IN CONDUCTING AN ORTHODONTIC PRACTICE*

BY J. LOWE YOUNG, D.D.S., NEW YORK CITY

ACCORDING to custom it becomes my privilege to address you as president of this society. As we have a full and important program, I wish to make my remarks as brief as possible so there may be ample time for full discussion of all papers.

I wish to express my appreciation for being honored with the presidency of this society and to thank the board of censors and the secretary-treasurer for their splendid work in preparing the program for the meeting. I wish also to thank the society as a whole for its cooperation in arranging the program, for without this splendid assistance the board of censors would have been unable to present such a program as you have before you.

It is not my purpose to review the orthodontic literature of the past year, but rather to discuss with you some ideas on conducting a practice of orthodontia.

I am taking up this question with the hope that there will be a full discussion of the question and I hope there will be no hesitancy in expressing differences of opinion. It is not to be considered a personal matter if any or all of you differ with the views expressed here and it should always be the privilege of each member of the society to frankly express his views with no thought of it being in the nature of a personal attack.

As a specialist in dentistry, the orthodontist naturally expects patients to be referred to him from various sources such as the dentist, the physician, the satisfied patient, and other orthodontists. It is, therefore, desirable to discuss the question under three heads.

Our duty to the dentist
Our duty to the orthodontist
Our duty to the patient

*President's address before the Twentieth Annual Meeting of the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

OUR DUTY TO THE DENTIST

The conscientious dentist, conducting a family practice, who desires to refer a patient to an untried orthodontist may naturally wish to determine to his own satisfaction, whether the orthodontist in his efforts meets his expectations. It has therefore been thought advisable never to assume, when such a reference is made, that the whole family, if there should be more than one child, is included in the reference. The orthodontist may logically think "Why doesn't Dr. A. ask me to look at the second child, who is six years of age?" Now it is quite possible that Dr. A. is well aware that the child of six requires orthodontic treatment, but that it is best to wait for a year or two until the older child has been treated, and then if the work is found to be satisfactory, there is still time left to take care of the younger child. In such cases I have considered it good practice to confer with the dentist who refers the case and find out what his views are on the subject, never assuming that where one child is referred the entire family is included.

OUR DUTY TO THE ORTHODONTIST

It is not to be supposed that the orthodontist can please all patients referred to him or all patients under treatment. The question therefore comes up occasionally as to what is the proper policy to follow when a patient under treatment by another orthodontist or dentist comes in desiring an opinion.

Before discussing this question in detail permit me to say that it is not advisable that the word of the patient, no matter how reliable he may be, should be taken against that of the practitioner, for it is not infrequent, when misunderstandings arise between the patient and the professional man, that the patient gets the wrong impression or wrong point of view.

It has been my belief that the orthodontist so consulted should not express an opinion of the work done by another man when appliances are in the mouth, in the absence of the man who has the case under treatment. There are many things which enter into this question which make it a delicate one, but I believe the outline given below in connection with such cases, is the best for all concerned.

The patient, when found to be wearing an appliance, is dismissed from the room, and the parent informed that owing to the fact that the child is under treatment by some one else, it is not advisable to discuss the case in the absence of the man who is doing the work. The parent may reply "I have finished with this other man." Now, I am supposing that the other man's name is a secret. In fact, I do not believe it advisable to inquire who the other man is.

My answer has always been "It is only fair for you to return to the man who has been treating the case and frankly tell him that you have decided not to have further treatment by him and ask that he remove his appliances and if he does not wish to do so, ask him to write a statement to that effect and that he has discontinued the case and is willing that you should have some one else continue the case with his appliances." If the parent refuses to

do this, I proceed as follows: "If you will be kind enough to give me the name of the person who has been treating the case I will confer with him and see if satisfactory arrangements can be made." If this request is refused, I decline to have anything to do with the case.

It has always been my custom in such cases to try to get the original models of the case but this as a rule is a very difficult thing to do. It is my custom, whenever patients wish to discontinue treatment, to supply the parents with the casts and radiograms so that the child may derive the most benefit when placed in the hands of another orthodontist.

As the treatment of cases in orthodontia extends over a period of years, it is often necessary to refer patients to orthodontists in various sections of the country for attention during temporary absence and here it seems to me is where many of us are remiss in the conducting of our cases.

It has been my custom when patients remove to another city temporarily, to write the orthodontist to whom the case is referred, explaining at some length what we are hoping to accomplish and the cooperation which we expect from him, while the patient is under his care.

Some of you may take issue with this view, feeling that the orthodontist to whom the patient is referred should be equally capable of caring for the case, but right here comes in the question of responsibility which is a very large factor in the treatment of cases of malocclusion. I do not feel it is advisable to shirk responsibility of the final outcome of a case which has been absent for a few months, neither do I wish to assume the responsibility for the teeth of a patient who has absented himself from my care, so I therefore think it advisable, in all such cases, to refer the patient to the orthodontist in the city where the patient is sojourning, and in such cases the orthodontist who is looking after the patient should have practically little or no responsibility in the case other than to follow the instructions given him.

Where patients remove permanently to another city it has been my custom to refer them to the orthodontist I feel is best qualified to look after the case, giving the patient or parent all the data I have on the case and writing the orthodontist to whom the case is referred, stating that the patient has permanently left my hands and telling him he is perfectly free to go on with the case, using my appliances if he so desires, or if he thinks it best to change the appliances, he is at perfect liberty to do so. Then I consider my responsibility in the case at an end.

I have heard of orthodontists starting cases that they knew were to remove in a few months to another city and then refer them to another for treatment and thus be relieved of all responsibility of the case. To this I am absolutely opposed. It is my custom to explain to the parent before beginning treatment how long it is liable to take to finish the case.

OUR DUTY TO THE PATIENT

In all professional work the welfare of the patient should be uppermost in our minds and this applies more to the specialist in orthodontia than possibly to any other branch of the dental profession at the present time.

Orthodontia, as a specialty, is but a couple of decades old, and it behooves

each and every one of us to be most conscientious in serving our clients, so as not to degrade the high standard that was set for us in the beginning by the founders of this society. We all know that it is a very exacting practice to engage in and it is only by paying attention to the minutest details and conscientiously striving to establish, as nearly as possible, the normal arrangement of teeth that we, as specialists, can hope to maintain this standard.

Specialists are consulted because they have had special training along certain lines which should enable them to render services not obtainable from the general practitioner. Parents who have put their children in the hands of the specialist have a right to expect that they receive expert, honest and conscientious treatment, and that nothing will be left undone for the welfare of their children.

If you find these thoughts worthy of your consideration, I hope there will be a full and free discussion.

Before I close may I impress upon all members the necessity for promptness, that there may be sufficient time for all discussions.

DISCUSSION

Dr. John V. Mershon, Philadelphia, was asked to open the discussion. He said: This is somewhat of a surprise to me. I was unfortunately out of the room and did not hear the former part of the president's address. I can only say that inasmuch as the latter part of his address dealt with the handling of children, in which they are referred from one city to another, I most heartily concur with his views. We have all probably gone through the experience of having patients sent to us from other cities with appliances just made, and placing us in a very embarrassing position. There is possibly no way of handling that case without making an uncomfortable situation. I must say, I think we take too lightly the question of the responsibility of these children when they come to us from other orthodontists.

I also agree with Dr. Young that when a patient is under treatment and is spending a few months usually at school in another city, the man to whom that patient is referred should only follow the directions of the orthodontist who has the case in charge.

I am sorry that I did not arrive earlier to hear the whole of Dr. Young's address. I know it was very good.

Dr. Oliver Wilson White, Detroit, Michigan.—One of the most important subjects that Dr. Young touched upon in his address, is the responsibility involved in those cases where the orthodontist finds it necessary to temporarily or permanently refer his patients for treatment to some other member of the profession.

A very frank understanding between yourself and patient as well as a definite division of responsibility should be arranged, in order to avoid any unpleasant discussions later.

Accurate data in relation to when the patient leaves or returns should be noted with proper study models for records.

I heartily agree with Dr. Young in everything he has said on this subject. The subject is a very interesting one, and should be discussed freely.

Dr. C. A. Hawley, Washington, D. C.—I think this is a very important subject and one that should be well understood. There are a good many points involved in the handling of transferred patients that may inadvertently give trouble. I remember in my early practice this question became very annoying. I recall very well that when I had to treat patients that had been referred to me and I was expected to finish out the contract made by the other man, the situation was often unsatisfactory. In later years, whenever a patient is going to leave and I know it, I finish up completely my transaction with him, so that all financial obligations with me are ended. I tell him that he must make new arrangements with the man to whom he is going and, it seems to me, the easiest way for the new man is to intimate to the patient that possibly he may wish to change the appliance; that very often appliances are changed,

and every man has his little individual ways with which he can succeed best with a patient. That makes it easy to do so without discrediting you or leading the patient to think that the change is made unnecessarily. All of us have little different ways of doing things, and for the benefit of the patient, let a man have his own way in caring for the case. From that time on the patient is his with full responsibility. I find patients appreciate the fact when each man is treated with courtesy and with kindness.

I think the outline laid down by the president in the matter of consultation is excellent and is one we should all follow. I could not improve upon the suggestions he has made. We are led into difficult situations sometimes from consultation with patients. They become dissatisfied in some way and walk into one's office and immediately want to criticize some other man's work. That leads us into a dangerous situation very often, and the outline laid down by Dr. Young is a safe one.

Dr. B. E. Lischer, St. Louis.—The president's address takes up a very timely topic and, it seems to me, has expressed it very tersely. It is a discussion of certain ethical relations which have been too long neglected. I have had the experience that when a patient suddenly changed residence and had to be referred to an orthodontist in some other city she was told that the appliances I had used were "out of date." Now the question of the efficiency of any appliance is, after all, a relative one. It is a matter of what one is able to use. I, for one, am willing to admit that many men accomplish good results with methods I would not employ, because I am not accustomed to the appliances they prefer. And this only proves that our methods are not standardized; and until they are it is idle to criticize the other man's method. When a patient is referred from one man to another and a change of appliances is imperative, a more courteous excuse can readily be found than to say that "his appliance is out of date." As long as an appliance measures up to certain fundamental requirements which are based upon the pathology and diagnosis in each case, it is beyond censor. There is no one, best method of treatment for any malocclusion.

I never knowingly start treatment of a case that will have to be transferred shortly thereafter. It is always better to advise postponement in such instances until the change of address has occurred.

I have often been amused at the attitude laymen usually assume when ethical principles are discussed in their presence. They are very prone to laugh at professional codes; but this is always due to ignorance. It is certainly very commendable to the professions that they are constantly striving to raise the ethical status of professional relationships. And it is the more commendable because it is voluntary. Sooner or later we will have to deal with this subject in a comprehensive and practical manner, because in the last analysis every relation in life has its ethical aspect. Ignoring this fact does not solve the abuses of life.

"The law of the wild things of the world is that their life thrives at the expense of other life. The spiritual law is that life develops its highest potency in the act of kindling truest life in others. The baser, cruel law still prevails in human society. Like all others we are subject to it. The tragedy of existence is that unwittingly we do harm to our fellows. Yet from the grasp of this law we must unceasingly seek to extricate ourselves, guided by the vision of better and best relations, which itself gradually becomes more distinct as we emerge from the evil relations." (Adler.)

Dr. Guy G. Hume, Toronto, Canada.—I do not wish to repeat what has just been said, as I agree with the different points embodied in the president's address, but there is one part I would like to discuss and that is the rights of the patient.

What I am about to say does not come from any personal experience but I have heard of cases in which the patients have requested the advice of some other orthodontist and they have been practically denied that privilege. I think that is a phase from the standpoint of ethics we should consider. We should consider a patient's standpoint as to his or her rights in regard to consulting some one else. We all make mistakes in judgment, and our patients should not suffer on account of them.

The subject of ethics brings up the question as to what standards we have in our society or by what code of ethics do we abide. The only written form I know of is that there shall not be any fee paid in connection with a case that is referred to one of our members. It is a big question we have to discuss in connection with ethics, and I do not

feel capable of expressing it, just as I would wish, but I think some action should be taken in the society, for instance, in formulating and in having some standard to which we should look as members of this society.

Dr. Lloyd S. Lourie, Chicago.—I remarked to some of my friends this morning that if ever I wished I might have the power of expressing myself clearly and forcibly, it was this morning, in regard to the questions brought up by Dr. Young in his address.

With all due respect to the men who are to appear upon the rest of the program, I want to say that I feel that the matters which ought to be discussed in connection with Dr. Young's address are more important than the rest of the program put together.

In the greater part of the remarks that have been made on this address, the importance of having right relations between the operator, the other orthodontist, and the dentist has been emphasized. I am glad our President made the statement that it is very important that we consider the rights of the patient, but unfortunately, Dr. Young, possibly with the intention of making a climax to the point of importance, considered first our relation to the dentist, next our relation to the orthodontist, and finally our relation to the patient. Now, it is my opinion that our specialty, as well as the professions of medicine and dentistry, has no ground for existence unless it is the good that is to be done the patient. It is not a money making scheme. Dental laws are passed with the idea ostensibly of protecting the public and patients and furthering their interests, and I think the sooner we come to a clear understanding and appreciate the fact that the interests of a patient are of more importance than those of any orthodontist or dentist connected with the case, the better it will be for our specialty.

As Dr. Hume has pointed out, it would be a very valuable thing if we could bring it before the Society, and we ought to consider it. If we can in some way arrive at what would be considered the best practice, ethically speaking, under various trying conditions that may arise, some of which have been referred to by Dr. Young, it would help us very materially. Some of these situations are extremely delicate and are modified greatly by conditions in the individual case, so that I think it would be very hard to lay down a rule that whenever a case comes to you from somebody else you are to follow a certain line of procedure. It makes a great difference, for instance, whether there is a quarrel between the patient and the orthodontist. It is quite conceivable, and you will all admit it, that there may be incompatibility of temperament between the operator and the individual, and, as Dr. Young has pointed out, no man can please everybody, nor can he be expected to, and he ought not to be criticised if he fails to get results in every case. If a patient has had a serious disagreement with an orthodontist, for instance, I think it is hardly fair to insist the patient shall go back and have further dealings with that man. The patient feels very strongly that he has been grossly mistreated, though Dr. Young says that not infrequently the patient has a misconception of the situation. I want to say, that frequently the patient has a very accurate knowledge of the situation, and very often the orthodontist has grossly abused the patient. Are we, on account of some mistaken idea of a code of ethics, to deny that patient the right of such information as we might be able to give him or her to help straighten out the situation? I have been considering this subject quite seriously for a long time.

A year ago Dr. Young mentioned it to me, and at that time I cited certain cases which had occurred in my practice, the nature of which was very different from the ones mentioned by him.

Dr. Young has mentioned the matter of a patient going from one orthodontist to another, and he has mentioned the matter of a patient moving to another city temporarily or moving there permanently, and it would be a good idea if we could formulate some rules or suggestions to govern us in such cases. If there has not been any dispute between the patient and operator, it would be much easier to formulate rules that could be followed. When there has been a dispute between the patient and operator it is a much more delicate proposition to handle. I do not believe that any particular plan of action can govern all cases. Dr. Young may decide from his experience that the plan he suggested seems advisable. On the other hand, from the cases I have had in my practice I might think it would be best to adopt a different procedure.

I try to put myself in the patient's position as well as in the position of the orthodontist, keeping in mind the fact that the patient's interests are of paramount importance,

or of greater importance than those of the orthodontist. I cannot help but feel that if a patient has the suspicion that treatment is not progressing satisfactorily, he ought to have some chance of finding out whether or not he is justified.

If we should think it advisable to appoint a committee to attempt to formulate rules of procedure for these cases, it certainly would be helpful, and particularly if some of the older members would give their experience.

I have had patients come to me for consultation, and not knowing anything about them, I would start an examination before knowing there were any appliances in the mouth at all, and they would want to know if the treatment was satisfactory. It has happened in two of these cases that just by a glance at the mouth I was able to say with perfect honesty that I felt that the case was progressing satisfactorily. One mother said, "Is it possible to get the result this man is trying to get with that appliance?" I might have dismissed that case at the time and have said, "I will not consult with you about this unless the other orthodontist is present." If I had insisted upon a conference with him it might have created some friction, and it would have created an atmosphere of distrust between him and the patient. So I am inclined to decide things sometimes upon my own responsibility if I feel sure of the facts. Ethics is to my mind the application of the Golden Rule. I did not see any objection to my having seen this case and passing comment, so long as I was able with perfect honesty to commend, not to criticize the treatment. I told this mother that it was possible to get a satisfactory result with that appliance. "It is not an appliance I am using at the present time, but I have used it and have obtained satisfactory results with it. Your orthodontist is following a line of procedure that probably will be successful. I do not know who he is; I don't want to know who he is. There is nothing about the plan of treatment or appliance which would prevent obtaining a satisfactory result." That patient went away with her mind at ease. She would go on with treatment, so no friction developed. That is much better than to have raised any question. This is one phase of the subject. If you will put yourself in the patient's position and consider your child under treatment, you would feel there ought to be some provision for getting information to enable you to know whether or not the right thing is being done for the child. I am not saying that there can be a rule formulated for this, but I certainly think it ought to be considered.

The first patient that came to me from another orthodontist came with this story: The boy had been under treatment for a long time, and the patient felt that not only was the case not as good as when it was started but in a worse condition. The child had been subjected to continued and severe pain and discomfort, so that school work had to be given up; he could not sleep at night, and all that sort of thing, and the mother of this patient wanted an opinion as to whether the appliances could safely be removed or not. Final payment had been demanded, though she contended that the case not only was not finished, but was in a worse condition than when it was started, and she said it was an imposition to ask for a final payment on the case. In addition to that, the orthodontist had told the patient that she could not expect any assistance from any other orthodontists; they would not give any consideration to her case whatever as long as the appliances were on, and if the appliances were taken off the teeth would be loosened and permanently injured. She dared not take off the appliances, for she was afraid if they were taken off the patient would be injured.

I would be censured if I interfered with the case and gave advice regarding it, and so I told her, as Dr. Young has suggested, that I could not consider the case at all or give advice regarding it till she had the appliances removed. She said, "I will not go back to that man to have the appliances taken off. He has insulted me. He has refused to give me any satisfaction as to when the case is to be finished, and I know it is worse than when it was started." I said, "Maybe you can get the dentist who sent you to this orthodontist to remove the appliances." She went to him and he said to me, "I don't see why you should not take off the appliances." This patient contends that she is absolutely through with the other man; that she would not go back to him under any circumstances. He said, "If she is willing to put that in writing, you are perfectly justified to give such a patient advice."

Upon that basis I agreed to advise regarding removal of appliances, with the understanding that if further treatment was necessary, somebody else must do it. I would not be in a position to criticize this case.

I had the patient come in, and in looking the case over the mother asked what would happen if the appliances were removed. I learned the history of the case, and said that when the appliances are taken off during treatment the tendency is for the teeth to turn toward their old position. She said, "I would be delighted if they would do that." (Laughter.) Having told her that, she said, "I prefer to have the appliances taken off if you feel that there will be no injurious effect, that the teeth will not loosen and fall out?" I replied, "I think not, and I do not think there will be any injury to the teeth; yet nobody can say the teeth will certainly return to their old positions." I gave my advice upon the supposition that her representations were true, which is contrary to the contention of Dr. Young. I consider that there are circumstances which enable one to decide as to whether a patient or an operator is to blame. I take issue with Dr. Young in that respect, though I would not assume such responsibility unless I was absolutely certain beyond any doubt. I may be mistaken, but in any decision you make you have to assume some responsibility, and I am willing to take that responsibility after I have made a decision.

Now, I removed the appliances for that patient. In the first place, I took impressions of the case with the appliances on, so that it would show the condition before any interference with it. I took that for the purpose of protection, for all parties, not knowing definitely the merits of the controversy. It would protect either party who was in the right. It would record the actual condition, and I would not have to report my opinion of the case. I figured that I would avoid controversy with the other man; I felt it was the fair thing to do.

Shortly after that the other orthodontist heard that this patient had consulted me. He said he would like to show me the original models, which he did. These were what I had been wanting to see. I could not see why he did this because the original models showed that the mother of the patient was absolutely right beyond any controversy. There was a beautiful arrangement of the molar and bicuspid teeth on both sides. The upper arch was narrow enough to crowd one of the cuspids labially; the lower incisors were misplaced, but there was no extreme malocclusion. There was a serviceable arrangement of these teeth and, as a result of the treatment, that was all broken up, and possibly permanent injury done. I felt that if for any reason whatever such a condition had developed in my practice, even where there were circumstances over which I had no control, I would feel like doing my best to correct it and if unable to do so, to make some financial adjustment with the patient just in a spirit of fair play, rather than insist upon the last penny of the contract. That man was simply taking advantage of a supposed adherence to the code of ethics for mutual protection. I did not propose to be a party to it. If I am wrong, I will accept the censure. However, I feel I was right.

Are we going to condone such actions as that by making no protest? I cannot feel that it is right. I believe it is a reflection upon orthodontia to let such things as that go on unnoticed.

As Dr. Hume has pointed out, there is no provision in our Constitution for taking notice of things of that sort, but I believe there should be. We have this one rule he has mentioned (regarding commissions), and I think you will all agree with me that it has been a very good rule, and it has been effective in deterring men from doing that very thing. If there are other things that can be put in a code of rules in the same way, I think they will do just as much good. There are lots of things happening, I know from personal observation, that are to the discredit of our specialty, simply because the operators do not have the proper sense of their responsibility to patients. They seem to have the idea that here is a profession that is going to enable them to make money easily, and that is the main consideration. Very little attention is given to the responsibility toward the patient. We hear men bragging about the big fees they get, and not of the fine results obtained for their patients.

There is another thing which bears upon the responsibility of the orthodontist to the patient. Dr. Young has mentioned a patient going to another city either temporarily or permanently, but what is to be the arrangement when the orthodontist goes to another city? What will be considered a fair settlement with the patients that are under treatment? Dr. Hawley has made a statement which bears on that somewhat, and I think his suggestion is a good one, that divided responsibility for the work or financial obligation is a bad thing, and that if a definite settlement can be made, it is much better.

I think there might be arranged a set of suggestions, if not rules, covering that point. It is going to come up from time to time when orthodontists move from one place to another, and it is a much more serious thing when the orthodontist moves, for many patients are left with incomplete treatment. The orthodontist had a grasp of the whole situation of each case from the start, and (ability being equal) nobody else can take that case up as satisfactorily and complete it as the one who started it could have completed it. Is there any adjustment due the patient? It is possible that the man taking over a practice is as competent as the man who had the practice, and the patient might be willing to continue with the same financial arrangement. On the other hand, a patient might feel that the first man was selected for some special reason, because he possessed great skill or had a very fine reputation. Has that man a right to turn these patients over to the man whom he selects to take care of his practice without asking these patients if it is satisfactory to them? Has he a property right in these patients that he can tell them to go to somebody else without regard to their interests? If I should move to San Francisco, to Boston, or to New Orleans, would it be ethical for me; would it be considered fair to the patient, for me to simply send my patients a notice that I was going to leave the city, and I had arranged with somebody else to take care of my practice, and that the financial arrangement would go on the same as it had been, and then leave within a few days before the patients had a chance to come in and adjust this matter with me? Would that meet with your sense of fair play? Now, what arrangements should be made if a man has decided to move from one city to another? Has he a right to turn these patients over to another and expect compensation from the man he turns them over to? Would it not be fair for him to pay the man who takes over his practice? We all have a number of patients whose treatments are not going as we expected them to go, and we should be willing to pay somebody else for finishing them.

There is a considerable responsibility in finishing cases. Patients come to me from here and there and say "Dr. So and So corrected this case and it needs a little attention to finish it." He has collected perhaps a big fee and has practically finished the case according to the patient's view, but I think some of you realize how unfinished some of these cases are when they come to you in that manner. It is unfair to the patient and unfair to the second orthodontist to let a patient go away with that understanding.

I have probably said enough to emphasize the point that there are situations which cannot be settled entirely on the lines Dr. Young has pointed out. Nevertheless we ought to do something about it. There ought to be a committee appointed to see what can be done to formulate rules of ethics for the Society governing such cases.

Dr. J. Lowe Young.—In closing I wish to express my appreciation of the free discussion given the subject brought before you today. We are discussing a rather delicate matter and I should like to ask Dr. Lischer if he had written the man to whom he referred the case of which he spoke.

Dr. Lischer.—Yes.

Dr. Young.—Then the man to whom you referred this patient was entirely in the wrong. You did what I should say is the correct thing in referring the case. The young man referred to by Dr. Lourie was placed in a very delicate position but if he had followed the course advised by Dr. Lourie, which I most heartily recommend, and taken a set of impressions showing the conditions of the teeth with the appliances in place and then found, when he consulted the orthodontist who had been treating the case, that the statements made by the parents were correct, then I think he had a perfect right to state wherein he considered the treatment was wrong even though it made bad professional feeling.

Probably I would not have had the same views when I began the practice of orthodontia as I do at the present time, but I feel that the duty of the orthodontist toward the welfare of the patient is so paramount that the truth should be told regardless of who suffers.

SOME THINGS A DENTAL PRACTITIONER SHOULD KNOW ABOUT ORTHODONTIA TO BEST SERVE HIS PATIENTS*

BY C. ANGUS KENNEDY, TORONTO, CANADA

AS THE heading of this paper signifies, this will be a talk with the general practitioner who lives in a city where he has the opportunity of conversing and consulting with an orthodontist.

There have been so few chances for him to receive any instruction in this subject, on account of so few essays appearing in our magazines, or such topics being so seldom on the programme of any of our dental society conventions.

The first step in this line would be to take care of the health of the patient and see that his nervous system would be able to stand the duration of treatment. As some cases are long, the history of health should be thorough, and, where necessary, advice given to the patient and parent.

The practitioner should have a knowledge of the development and growth of the tooth, the alveolar process, and pericemental membrane, the characteristics and functions of the bone cells in tearing down and rebuilding of bone and tissue, the development and normal use of the muscles of the face and jaws, the disuse and abuse of these same muscles and the resulting malocclusion. These results are often the cause of the growth of adenoids and nasal obstructions, which in turn cause mouth-breathing. Through lack of proper instructions, the child is allowed to continue in this practice, producing a great malocclusion, facial deformity, and pathologic conditions of the respiratory tract.

We see these patients from afar,—thin, sallow cheeks, undeveloped upper lip, protruding upper anterior teeth, narrow-chested, and a general appearance of being poorly nourished. These symptoms belong to the mouth-breathing habit, and are started by the patient not being able to breathe through the nose on account of adenoids or nasal obstructions.

The respiratory tract should be examined and treated by a rhinologist to clear the passages. After this has been accomplished, the lips should be held together at night by adhesive tape, or some such appliance, until the habit is broken and the patient is breathing in a normal manner.

Another habit is that of tongue biting or finger^s sucking, which is very hard to overcome, and which produces an infraocclusion, the patient being unable to bite anything with the anterior teeth.

By studying the eruptive period of the temporary and permanent teeth, the general practitioner should know when to extract and when not to extract. In deciding this point he should be sure of his diagnosis and also be able to give a good prognosis of the case. The extraction of temporary teeth

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too early will allow the remaining teeth to drift, closing the space for the permanent teeth following. Also, the extraction of the first permanent molar is a dangerous operation, as it allows the second molar to tilt forward, causing the inclined planes to occlude in a mesial position, and forcing the opposing jaw into malocclusion. In fact, the extraction of teeth for the correction of malocclusion should be studied very carefully, as a couple of years afterwards a much greater deformity may take place as a result of the extraction.

A thorough knowledge of the causes of the promotion and delaying of eruption of the teeth, such as syphilis, rachitis, tuberculosis, is also very necessary.

In speaking on this subject it should be impressed upon all practitioners that we should have a good idea of what correct occlusion is, and what it stands for, as malocclusion is only recognizable as being away from normal occlusion. This is one of the first requisites for giving a good diagnosis, and we cannot give proper treatment without the knowledge of the fundamental principles. It is absolutely imperative that we be able to correctly diagnose malocclusion before we can hope to successfully treat it. It is necessary to know the relationship of every tooth, cusp, and inclined plane of the teeth of the mandible to the teeth of the maxillæ.

Malocclusion of the teeth is not inherited. The child inherits characteristics from the parent, but the influence on malocclusion is limited to the environment of the child, whether it be in its embryonic state or after birth.

Under modern methods of living, a very large percentage of babies are bottle-fed. Aside entirely from the vital necessity for the baby's food being so prepared as to contain a "balanced diet" during this important period, it is essential that the child find it necessary to thoroughly exercise the jaws at the time of feeding.

The baby should be held in the arms in the posture as for breast-feeding and the bottle so held that the child is compelled to work for the food. A most pernicious habit is that followed in many cases where the bottle is propped up and a nipple used permitting such free flow of food that practically no effort is required on the part of the child to obtain the food.

Food and exercise are the most important elements in the proper development of the dental arches, and my plea is that the advantages of thorough mastication be not overlooked, even in the case of the very youngest child.

One should have a good working knowledge of the above events in the life of a child, to be able to give a good diagnosis and information to the parents. A physician, in being called to the bedside, gives a thorough examination and diagnosis of the symptoms as he sees them, and gives his patient the result of his deliberations. This advice might be for consultation with a surgeon or specialist, or for an operation. The result is that the patient is receiving the best advice and services which are possible. Our consultations should take place early in the life of the child, so that the orthodontist would not have to wait until the permanent teeth are all in position before starting a difficult case. The orthodontist needs the hearty cooperation of the practitioner all the time, and if we could work in closer touch and together,

the patients would all be benefited. An example of this was brought to my attention a few weeks ago, when one of our best practitioners had inserted an inlay in a premolar for a patient who was also under the care of an orthodontist. He thought he had a very good result in the inlay. The grooves and marginal ridges were in good condition, and he had splendid occlusion. The orthodontist said that the mesio-distal diameter of the reconstructed tooth was not wide enough, and that the inlay should be $\frac{3}{100}$ of an inch longer, so as to keep the correct occlusal line.

The consultation which afterwards took place between the practitioner and the specialist was very beneficial to both, as each saw the oral cavity from the viewpoint of the other, and the result has been an education and a great help to both,—the specialist pointing out the phases where his difficult work can be assisted by the practitioner, especially in the case of extractions, carving cusps for fillings and inlays, and permanent restorations for retaining appliances, and the practitioner explaining his features of the case.

If we, as a profession, are going to render the greatest possible service to the public, there must be closer cooperation between the dentist and the orthodontist. There are many difficulties which we have to overcome, and by working together the patient is bound to benefit, and the oral cavity of the child will be set in a healthy and normal condition. Often, we who are spending all our time in trying to get efficient results have some hard problems to solve, when a consultation would help materially.

There has been a tendency in the past for the two branches of dentistry to drift apart, instead of combining their efforts.

There is a great field for the general practitioner in the new department of preventive orthodontia. He comes in contact with the child before the orthodontist, and could prevent numerous cases from developing into severe cases of malocclusion.

He should know occlusion and be able to recognize irregularities in a developing mouth; also, that the time to correct any malocclusion is as soon as the tendency manifests itself, not waiting until the patient is older, or until all the permanent teeth are in position. The case should be completed by that time, instead of just beginning.

When a young patient is found to be a mouth-breather, he should look for the cause along the respiratory tract; or when a temporary tooth is remaining in position too long, and thereby causing the permanent teeth to erupt in a malposed position; or when a child is not developing the normal spaces between the anterior teeth, showing that the jaw is not expanding and nature is making no preparation for the reception of the larger permanent teeth; if he would send the patient for a consultation with an orthodontist, their combined judgment would result in better service to the patient.

It takes a long time and special study to properly diagnose and pass judgment on the treatment of malocclusion and the dentist often overlooks conditions today that tomorrow may prove to be most serious deformities.

Dr. F. B. Noyes says: "It should be the dentist who would send patients to seek the services of the orthodontist, and if the dentists were alive to

their responsibility, and were sufficiently informed to recognize the existence of malocclusion before it developed into deformity, it would be better for all concerned."

In conclusion I would say that the closer the relation concerning consultation between the dentist and the orthodontist, the better it will be for the dental profession and the general public.

DISCUSSION

Dr. H. B. Hamilton, Ithaca, N. Y.—I do not know that I can add anything of particular interest to this excellent paper, because I agree heartily with most of the things the author has said. There is one thing, however, I might lay a little stress upon, and that is that the average dentist does not seem to appreciate normal occlusion or normal tooth forms. One of the most common troubles we have to contend with is the poorly shaped occlusal restorations. The average occlusal filling or inlay is flat and destitute of fissures and grooves, and this type of work seems to be more or less general, judging from what I see in the mouths from many parts of the country. It is my practice to reshape these restorations with a bur to some semblance of normal form.

It seems to me that if the general practitioner gives any attention whatever to orthodontia, he will very soon appreciate the necessity of normal tooth form and his restorations will improve wonderfully, both to his own and his patients' advantage.

Dr. Joseph D. Eby, New York City.—I have enjoyed the Doctor's paper very much and am glad that our Committee had the foresight to incorporate this subject into our program for several reasons:

This is always a timely subject, for it is impossible for specialists to regard too keenly, or have their attention called too frequently to the great obligations they are under to general practitioners and specialists in other services.

It is my opinion that alas too few of us have meditated over this subject and given it the study which it merits and accordingly adopt a definite policy toward fellow-men in order to overcome our various short-comings in traits of character and temperament as we should in relation to this topic.

The relation between the specialist in a given field and the general practitioner is one which must be handled in a very careful and tactful manner and which, if analyzed, becomes a recognition of mutual intelligence, wherein the minds must be brought together from divergent thoughts, which time under different duties naturally effects, to an equal basis or common meeting ground, in order to best serve their patients.

As soon as one man assumes the attitude that he knows so much more than the other fellow, that moment he begins to show his own self-centered disregard and begins to develop self-destructive conditions which, upon becoming his repute, are dearly paid for, as the self-placed halo over the high brow eventually becoming a millstone around the neck.

There is also the opposite extreme to this attitude which reflects self-centeredness and becomes so objectionable to some men that their attention is only fretted instead of attracted, that is, the attitude of such simple simplicity, such as would better suit a layman in discourse on the subject.

I do not think that any of us like to be led to feel that we are or should be freshmen students again; it is very easy to broach the practitioner's feelings in this way, thereby exchanging difficulties for the purposes sought.

There is no law which defines orthodontists; legally we are dentists and our relations with practitioners should be from the viewpoint of dentists, not separated by some mystic portal beyond which orthodontists thrive in another atmosphere.

The thought which I am endeavoring to express may be perhaps better illustrated by describing a happening which came under my observation and being partially instrumental was much to my embarrassment.

Once an orthodontist of great reputation travelled a long distance to take some thoughts

on orthodontia to a meeting of a large body of general practitioners who had gathered from several states to hear him.

His interpretation of that situation was to expound the highest theories and most tedious technic which are the very reasons why orthodontia is a specialty and is prohibitive in that sense in general practice.

His mission was lost with the wonderful opportunity he had to do great good, because of his failure to realize that those dentists were hungry for more of the fundamentals with which they could serve humanity better by knowing how and when to cooperate with orthodontists or in the treatment of some simple conditions, and he left them worse confused than when he met them, with a bad attitude established toward himself and discouragement toward orthodontia, when as a matter of fact their work is more important to us than our work is to them.

If orthodontists will meet their fellow professional brethren as equally highly trained technicians in other practice, carry the proper message to them, and deal with them in the plain matters of fact, compatible with a generous mixture of the Golden Rule, then and then only will the flavor be pleasant and become the asset of each individual's usefulness and a credit to the cause to which each one devotes his life's work.

I trust that what I have said is entirely consistent with Dr. Kennedy's thoughts as I would hate to be guilty of departing from the essence of this too important phase of our work which makes and breaks so many men.

I wish to thank friend Kennedy for bringing the thoughts in this able essay to us and also trust that copies of it may fall into our hands during the quiet hours, when after reading it again, we may inventory ourselves to the fullest extent of our personal needs along these lines.

Dr. Frank A. Delabarre, Boston, Mass.—I would like to speak on this topic in particular because I was a general practitioner before I took up the specialty of orthodontia, so I feel peculiarly kindly towards both classes of men, knowing intimately the problems that confront them.

There is one point I would in particular emphasize as being the one way in which the general practitioner of dentistry can help the orthodontist most. That one way is through an adequate appreciation of the fact that it is absolutely essential to preserve the temporary teeth in health throughout their intended life. And why? For the most obvious reason that in all cases of malocclusion that we come across neglect of the temporary teeth seems frequent and most severe, complicating the things with which we have to deal. If we could have our cases of malocclusion come to us without the complications that creep in through neglect of the temporary teeth, through their decay, through their being abscessed, and to early loss, our cases of malocclusion would be much simpler to handle. In that way alone the dental practitioner could help us to the greatest extent.

Dr. C. R. Baker, Evanston, Illinois.—I agree thoroughly with all that was expressed in the paper and also in the discussion. There is one idea that I might add and that is, when deciduous teeth are lost prematurely, the general practitioner should see that the normal space is maintained in the arches. An efficient appliance should be placed by the dentist or by an orthodontist. In case a deciduous molar is lost prematurely, the space maintained should be the mesio-distal width of the deciduous molar rather than the mesio-distal width of the corresponding premolar.

Dr. John A. McPhail, Cincinnati, Ohio.—I think we have made a mistake because we have our cabinets filled with malocclusions. I believe the average general practitioner does not understand normal occlusion and the care of the deciduous teeth.

In attending any dental meeting you hear a great deal about the occlusion of teeth, and it seems peculiar to me that a man who can get the teeth in normal occlusion cannot recognize a malocclusion in a deciduous set of teeth. That is one place where we make a mistake. Everything is malocclusion with us. I have a boy of 6, and I am unfortunate in having another child who has only normal occlusion on one side. He has a perfect set of teeth on one side with normal occlusion. I have taken impressions of their teeth and have been making models, and when a case comes in I get out these cases of normal occlusion. In

my boy the occlusion is not quite normal. He is one of those borderline cases. I show the little patients what a normal occlusion is, what a normal arch is, as I can understand it. It seems to me, it ought to be embarrassing to a general practitioner to have a mother or one of the parents call attention to a malocclusion when he has been working for the child for years. It would be embarrassing to me I am sure. Those who are engaged in general practice must have a great many cases of malocclusion in their practice. There is a tendency for all of us to see in the mouth the things for which we are looking. If you are a pyorrhea specialist, and a patient comes to you, you will see pyorrhea. You may want the teeth that are involved taken out. On the other hand, the bridge man wants to put in a bridge. I think all the average orthodontist can see is malocclusion. It seems to me, we should view the mouth as a whole. It would be a good thing for us to see the mouth outside of malocclusions once in a while and to remember that there are other things in the mouth besides deformities. We can be of great help to the general practitioner in this way as well as be of profit to ourselves.

I have tried to cooperate with men who send me cases. I like to send back a patient to a dentist who referred the case to me after the appliances are on to see whether he agrees with me as to how the bands ought to be put on, and later I send the patient back to him to see whether I am keeping the teeth in proper shape and in regard to the general condition of the mouth. It is up to us, I think to cooperate with the general practitioner rather than set ourselves apart as somebody who is wiser than the rest, because the chances are we are not very much different.

Another thing: Dr. Dewey had an editorial some time ago about extracting teeth. I had a little patient come to me recently who was sent to have some teeth extracted in order to make room for the laterals; with the instruction that if we took out the temporary cuspids it would make room for the laterals. We all know that it would, but how much trouble we would get in later on. An exodontist said that was not the right thing to do, but if the general practitioner wants to have it done, I will do it. It is unfortunate that our consciences can be made so blunt that we are influenced to do these things even though we know they are wrong. I believe when an exodontist will extract the teeth of a patient when it is not indicated, we have a right to censure him and tell the patient he was wrong. I do not think we need to use any diplomacy about that, because the patient ought to know. If the exodontist extracted the teeth through ignorance, it is a different proposition.

Dr. C. A. Kennedy, Toronto, Canada (closing).—I want to thank the members for their liberal and free discussion. If we could take a referred patient to the practitioner and explain what we purpose doing and show him some of our difficulties, we would gain his co-operation much more sympathetically. Our specialty needs this, and we should strive at all times to gain it.

TREATMENT OF A CASE OF COMPLEX NEUTROCLUSION NECESSITATING EXTRACTION OF TWO MAXILLARY AND TWO MANDIBULAR FIRST PREMOLARS IN ORDER TO PRESERVE THE FACIAL OUTLINES

BY A. C. ROHDE, B.S., D.D.S.,

From the Department of Orthodontia, Federspiel's Dental Polyclinic, Milwaukee, Wis.

DURING the last two decades it has been the universal practice by orthodontists to treat all cases of malocclusion by establishing a normal relation of the inclined planes of the cusps of the teeth, in order to produce the proper function of the dental arches.

For many years, as an associate of Doctor M. N. Federspiel, we have, to a great degree, followed this method of practice. However, during the last years, we have come to the realization, from our knowledge of experience in

Fig 1.

Fig 2.

the treatment of orthodontic cases, that, in order to obtain a favorable prognosis, it was necessary to depart from the tramels of custom and the difficulty of overcoming the dead weight of authority of certain rules that had been established.

In our experiences, we have observed that in some cases where we obtained a normal relation of the inclined planes, we had disturbed the harmonious relation of the facial contour. Furthermore, in some of these cases of complex neutroclusion, the molars and premolars had shifted forward on

account of the early loss of the deciduous canines, causing the canines to erupt outside or inside line of the arch, while the incisors were in normal relation and giving proper balance to the facial contour.

In the following case, which I herewith report, is a striking example of such a condition:

Miss K., a young high school girl, fourteen years of age, weight 125 pounds, came to our clinic for orthodontic care. Her general health was good, breathing normal, and no enlarged tonsils or adenoids. Her jaws were fully developed, all permanent teeth, with the exception of the third molars, erupted. Her facial outlines we considered normal. The maxillary canines were in infra-

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

labioversion, the mandibular left canine in labioversion, the right mandibular canine in linguoversion, and the anterior incisors crowded, the premolar and molars having shifted mesially.

Diagnosis.—Complex neutroclusion. According to past teaching and the stand so many orthodontists take but not always practice in regard to extracting the premolars made us make an exceptionally close examination in this case to bear out our contention. We could not bring ourselves to believe that, if we enlarged both arches to make room for the canines, we could, in all justice to the patient, preserve her individual normal.

The treatment consisted in extracting both maxillary and mandibular first premolars. Anchor bands were then fitted on the first molars with spurs

soldered to the buccal surface, and the soldered lingual arch resting against the lingual surfaces of the anterior teeth served as secondary anchorage. Bands with a labial spur were fitted to the canines to which rubber elastics were applied and snapped to the spurs on the molar anchor bands. In this way the canines were gradually brought into place.

After this had been accomplished, the appliance was removed and reconstructed with power tubes and labial arch, and the rest of the teeth brought into alignment. No retainers were worn, the teeth retaining themselves.

Fig. 7.

Fig. 8.

Figs. 1 and 2 show the profile and front view before treatment. Notice the facial lines are not distorted. Figs. 3 and 4 show the side and front view of casts of teeth before treatment. Note malposition of teeth. Figs. 5 and 6 show the case one year after orthodontic care. Figs. 7 and 8 show front and profile of patient 1 year after orthodontic care. Had we expanded and enlarged the arches without extracting the first premolar teeth, this condition would then have distorted the facial lines, because the enlarged arches would be out of harmony with the contour of her face.

PRACTICAL APPLICATION OF BIOLOGIC LAWS*

BY CALVIN S. CASE, M.D., D.D.S., CHICAGO, ILL.

WHAT interests us most as orthodontists, especially as we essay the correction or improvement of facial beauty that is marred or deformed by malpositions and malrelations of the teeth and jaws, is the fact that in our country, the United States above all other countries, the union of dissimilar types occurs most frequently. The laws of heredity do not necessarily produce in the offspring a blended composite type. In fact, such an occurrence from parents of dissimilar types of both plants and animals often exhibits an association of separate distinct physical characters that have come from both parents or their progenitors. A slight observation of family physiognomies must fully demonstrate the inheritance of distinct features of both parents, and when this occurs in the associated parts of a physiognomy, it may result in the most decided disharmony of the features. "For Nature knows no laws of esthetics, as beautiful and harmonious as her products are."

Under the forces of atavistic heredity, also, there have frequently arisen peculiar and inharmonious characteristics which could not be remembered as having previous existence in immediate forebears, but which have been definitely traced through records of history to some very distant progenitor.

These laws were fully recognized by both Darwin and Wallace in the earlier researches of evolution. Huxley, more than forty years ago, in writing upon the laws of heredity and variation, said: "It is a matter of perfectly common experience that the tendency on the part of the offspring always is to reproduce the form of the parents; that is a matter of ordinary and familiar observation. In all cases of propagation and perpetuation, there seems to be a tendency in the offspring to take the characters of the parental organisms. You do not find that the male follows the precise type of the male parent, nor does the female always inherit the precise characteristics of the mother—there is always a proportion of the female characters in the male offspring, and of the male characters in the female offspring. There are all sorts of intermixtures and intermediate conditions between the two of dissimilar types, when complexion, beauty, or fifty other different peculiarities belonging to either side of the house are reproduced in other members of the same family. You will also see a child in a family who is not like either its father or mother; but some old person who knew its grandparents, or it may be an uncle, or perhaps a more distant relative, will see a great similarity between the child and one of these."

The disharmonies in esthetic facial outlines which are caused from malposed

*This article is revised from the fifth of five chapters of Part II entitled "Etiology of Malocclusion" in the forthcoming revision of "Dental Orthopedics" by Dr. Calvin S. Case. The first chapter entitled "Etiologic Principles of Malocclusion with Reference to Treatment" was published in the September, 1920 number of Dental Items of Interest. The second, third, and fourth chapters entitled: "Etiologic Influences of Deciduous and Erupting Permanent Teeth with Principles of Treatment; Laws of Biology regarded as Etiologic Factors in Malocclusion; Heredity and Variation Ethnologically Considered, were respectively published in the March, April, and June issues of this Journal.

teeth are quite as diversified as disharmonies in size, form, and relation of the features of different physiognomies compared to the symmetrical. How often do we see some one feature of a face too large or too small for the rest of the features of which it forms a part, and this is true in varying degrees of every feature and organ of the human body as compared to that which may be considered as the truly normal or symmetrically formed type.

The surface-contour, form, size, and varying positions of the features which compose the human physiognomy are largely dependent upon the osseous framework, which in turn is, normally, either an inherent type or the union in the offspring of types which vary from harmony to the distinctively disharmonious. In all conditions of health and normality, these same influences and laws of development constitute the causes which govern and determine the relative sizes and forms of every organ and natural contour. From these sources have mainly arisen all the distinctively different types of races.

In America, where the union of disharmonious types has had full sway, we find a great variety of disharmonies in the physical forms of its inhabitants. On the other hand, among people such as the Japanese and the Chinese, whose native countries are not so extensively encroached upon with the intermingling of foreign types, individual disharmonies and variations from the racial type are comparatively uncommon. And while their characteristic type, from our viewpoint, may be far from that which we recognize as the highest physical development in beauty and perfection of form, it nevertheless is that which has normally arisen under the influence of heredity, natural selection, and environment, and consequently *to them it is a normal type*.

One of the characteristic dento-facial types that is common with a Japanese physiognomy is a depression or unesthetic retrusion along the upper part of the upper lip, and at the base of the rarely prominent nose. This depression heightens the usual pronounced malar prominences and shortens the somewhat thin upper lip in its relation to the incisal ends of the teeth—the lip itself approaching a prehensile inclination of 45 degrees. In a number of cases which the author has examined, the disto-mesial relations of the buccal teeth were normal in occlusion, while the labial teeth, particularly the incisors, were more labially inclined than we would consider esthetically normal. The cutting edges, especially of the upper incisors, were more or less protruding, which seemed to be due to a retrusion of the apical zone, or that which we would denominate from an esthetic standpoint, a repression of the normal development of the middle features of the physiognomy. If this condition, which is a normal Japanese type, occurred with an Anglo-Saxon, *as it occasionally does*, it would be diagnosed as *decidedly abnormal*, notwithstanding the perfect occlusion of the buccal teeth. And in all probability, if not an inherited type, it would be caused by some abnormal condition of the maxillary sinuses, and result in a lack of development of the intermaxillary processes, and would demand a bodily protrusive movement of the apical zone of the incisors, and a retrusive movement of the incisal zone to correct the facial outlines. See Type C, Division 2, Class II.

Much could be written and quoted along this line, but space will not permit. With a moderate understanding of the ethnologic principles of biologic develop-

ment, it will be seen that all forms of animal life about us are the offspring of progenitors whose physical and mental characteristics they repeat to a very large extent, either by direct inheritance with the blending of types, or with the association of the distinct characters of one or both parents, or through atavism from more distant progenitors, etc.

The immediate association in the physiognomies of individuals of distinct characteristics of the different racial types from which they sprung, through some form of heredity in which Mendel's law may have played a part, is one of the most important ethnologic considerations. In connection with these sources of reproduction, one should not forget that the law of natural variation is always and everywhere in action through the metabolic activities of the germ cells, with the same transmissible properties as those of long lines of heredity.

PRINCIPLES OF HEREDITY IN RELATION TO TREATMENT

The following phase of this subject pertains to that which we find exemplified everywhere about us. First, to the relationship as regards size, form, and relative position of the mandibular and maxillary bones proper, to the rest of the bones which form the framework of physiognomies; second, to the relations of the dental and alveolar arches to the mandibles and maxillæ—both with a view of comparing the disharmonies we commonly find, to that harmony of dento-facial relation which accords with our present standard of perfection and beauty.

It will be seen that the types of people present the most marked differences in the form and size of the bones which constitute the framework of human bodies. Thus we have tall and short men, either of whom may possess strong heavily built bones or slender delicate ones. Nor does esthetic harmony or the typically anatomical prevail, except rarely. Moreover, it is common to find disharmonies in the sizes and relations of bones which are closely associated, as the bones of the face, and which can frequently be traced to direct inheritance, or the admixture through some channel of heredity of disharmonious types.

In this investigation, which anyone with an observing mind may pursue, there will be found to exist every possible variation between the so-called "freaks" and those of Apollo-like harmony and perfection. We find noses of every possible shape in relation to harmony with the features upon which they are placed, and jaws prognathous and retruded in relation to the rest of the features. This must be equally true of the sizes of teeth whose width measurements have been erroneously employed to determine the sizes of the newly regulated dental arches. If the sizes of dental arches are made in exact mathematical proportion to the width of the upper central incisors, will not these arches be found at times too large or too small for facial harmony, and to an extent that is noticeably deforming? We frequently find the sizes of the front teeth quite out of proportion with the features. Moreover, the circumference measurements of the right and left centrals and other teeth are rarely exactly the same, and commonly vary in their circumferences under normal conditions, $1/64$ to $1/32$ of an inch, and at times even more.

Many of the facial disharmonies pertain to the dental and maxillary frame-

work, and characterize the physiognomies as plain, homely, or deformed, according to the character and amount of the protrusion or retrusion over the dento-facial and mandibular area.

In many protrusions, both unimaxillary and bimaxillary, the entire bodies of the maxillary bones are protruded in their dento-facial relations, and this is easily determined by the prominence of the chin and the prominence at the base of the nose and along the upper portion of the upper lip. In many of these cases the teeth are in perfect harmony of size and position with the protruded jaws—in arch width, alignment, and inclination—and yet distinctly out of balance with the esthetic relations of the rest of the features. In bimaxillary malpositions the dentures are often found in typical occlusion in the white as well as in colored races, because both dentures are equally protruded. Again, in a large proportion of protrusions, the protrusion pertains mostly or wholly to the dental and alveolar arches alone. As an illustration of this, see the beginning of Dr. Cryer's case (Chapter X) and the physiognomies of bimaxillary protrusions illustrated in this work. Moreover, in nearly all typical protrusions of the

Fig. 1

dentures not due to local causes, the teeth are crowded closely together, showing that the buccal teeth partake of the protruded malposition quite as much as the labial teeth.

Attention is called also to the variety of antero-posterior malpositions of the lower denture in relation to the mandible. Fig. 1 is made from the facial casts of two cases before treatment. The mandible of the one on the right, judging from the facial outlines, is seen to be decidedly prognathous, but from the relative position of the lower lip, the lower denture must be in about normal dento-facial relations. With the case on the left, judging from the relative positions of the chin, the lower lip and labio-mental curve, these conditions are reversed, that is: the mandible is in esthetic dento-facial relations, but with the lower denture protruded.

These two cases, like many others which could be pointed out, illustrate the decided dissimilarity in types which may arise *with the same character of occlusion of the dentures*. These belong in Class III in which the upper denture is more or less retruded, and with the lower denture closing far in front of a normal occlusion with the upper denture. Illustrations of this kind, moreover,

definitely show that through that most prolific form of heredity—i. e., the sexual union of dissimilar characters—even entire upper or lower dentures take decidedly different positions at times in relation to the bones in which they grow.

Thus many of the most pronounced, as well as minor malocclusions, having every possible malrelation of the teeth, jaws, and facial outlines, have arisen through one of the many avenues of heredity. The proof of this statement is so plainly shown on every hand, and, moreover, it accords so thoroughly with the laws of biology in both flora and fauna, that the fantastic claims that “all malocclusions arise from local causes,” and “God does not make such mistakes in forming the human anatomies,” etc., must be regarded as crass ignorance of the well established principles of heredity.

This brings us to a point which should be emphasized, because it pertains to the question of early correction, and particularly to the teaching of shifting the deciduous buccal teeth and recently erupted first molars to normal, in all cases of disto-mesial malocclusion, even though the buccal cusps are in full malinterdigitation.

It should be understood that the author is heartily in accord with this movement for young patients, where it is distinctly seen to be demanded. The cases that demand it are: First, those which arise from local causes and which otherwise would have been in normal relations; and second, from whatever cause, if one denture or the other is retruded in its dento-facial relations, and the other is not so protruded but that the slight distal movement that is necessary for its correction can be safely and advisedly performed.

If it is other than this, as it is quite liable to be, where the lower denture is destined to be normal, or not protruded, and the opposing denture, through heredity, is destined to be decidedly protruded, the operator can rest assured that the shifting of the first molars to a normal occlusion, *at whatever age, will ultimately result in a bimaxillary protrusion*, permanently marring the beauty of the face. Nor can one be sure what the adult conditions are destined to be at this very early age, when the bones are just beginning to take on the inherent stamp of their progenitors.

In the hundreds of cases which have come under the author's observation during the ages of childhood and youth, there is no room to spare in the jaws back of the deciduous molars, except at the time preparatory to the eruption of the first permanent molars, and finally the second, and then the third molars; the latter being often obliged to occupy quite as crowded positions in protruding cases as are seen when teeth are not protruded. In other words, in all cases of typical protrusion in the white race due to heredity, the natural position of the back teeth in relation to the tuberosities and rami allows no more than a very moderate distal movement without encroaching upon space demanded for the succeeding molars, a demand which Nature will at one time or another insist upon, or else make trouble.

Therefore, in all marked inherent protrusions of the upper, for example, if the first molars are extensively moved distally for the purpose of placing them in a normal occlusion in early childhood or later, one may count quite surely upon ultimate disappointment of intention. If the teeth do not go back to their former

inherited malinterdigitation, as they are quite liable to do through the eruptive forces of the second or third molars; a bimaxillary protrusion, which is quite as bad, will be stamped upon the features through life.

In the discussion of a paper read before a prominent society upon the advantages of radiograms in orthodontia, a prominent teacher in a dental college—who evidently had caught the “bone growing” fever—criticised Dr. Cryer’s warning in regard to the excessive distal movement of molars, and he did this upon the bare evidence of a single case that he illustrated with the lantern, showing a third molar which evidently had been impacted by a distal artificial movement of a second molar, and which had finally erupted to normal position. This speaker expressed in unmistakable terms his belief that the crowding of the teeth and the artificially applied forces will stimulate an interstitial extra growth and elongation of the jaw-bone itself, and thus carry all the denture forward and give plenty of room for the third molars. This is abundantly proved to be untrue by the many instances of crowded dentures that are protruded in relation to the jaws in which they are placed.

If Nature possessed this power in the individual to cause the jaws and associate bones to grow to meet the requirements of room and facial harmony, or if it were possible for us to stimulate Nature to an extra interstitial growth, there would be far more harmonious relations between the sizes of dentures and jaws than are seen to exist. We would not so frequently see retruded chins in connection with crowded and prominent lower teeth, or those marked cases of bimaxillary protrusion which are not usually noticeable until ten or twelve years of age, and which seem to increase in prominence during adolescence.

There is every reason to believe from the most advanced authorities upon biology that the bones of individuals cannot be forced to *grow* larger than their inherited sizes, nor would they have ever grown larger than any primitive fixed state, had it not been for the laws of *natural variation* and “survival of the fittest.”

The following quotation from Stackpole’s “Biology,” should forever set at rest the fantastic theory of “bone growth.” “*It is well known that all plants and animals have a definite limit of growth.* From the cytological point of view, the limit of body-size appears to be correlated with the total number of cells formed rather than with their individual size. This relation has been carefully studied by Conkline, (1896) in the case of the gasteropod *Crepidula*, an animal which varies greatly in size in the mature condition, the dwarfs having in some cases not more than one-twenty-fifth the volume of the giants. The eggs are, however, of the same size in all, and their number is proportional to the size of the adult. The same is true of the tissue-cells. Measurements of cells from the epidermis, the kidney, the liver, the alimentary epithelium, and other tissues, show that they are on the whole as large in the dwarfs as in the giants. The body-size, therefore, depends on the total number of cells rather than on their size, individually considered, and the same appears to be the case in plants.”

CASE REPORT*

BY GRAFTON MUNROE, D.D.S., SPRINGFIELD, ILL.

THE case here shown is one exhibiting the result of delayed extraction of deciduous teeth and impacted supernumeraries. The patient is a girl of twelve years of age.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

*Reported before the American Society of Orthodontists, April 5 7, 1920.

The illustrations show the following condition: Fig. 1, frontal view, shows the maxillary left central (permanent) erupted between the deciduous teeth (central incisors), and standing in torsion (about at right angle).

Fig. 2 shows maxillary right lateral and canine in position, but no right central—being a profile view and showing the deciduous central still in place.

Fig. 3, made from x-ray pictures, shows the right central hindered in its eruption by a supernumerary and the supernumerary held back in its eruption by the deciduous central much delayed in extraction. The extraction of the deciduous incisors allowed the permanent teeth to advance so that the supernumeraries could be reached surgically and extracted. After the rotation of the maxillary left central, the permanent lateral and canine came into position, but there developed a wide space between central and lateral, and the cause proved to be another supernumerary, as shown in Fig. 4.

Fig. 5 exhibits a two-thirds profile and front view—with both centrals nearly in normal position—the case still being under care.

THE LINGUAL EXPANSION WIRE*

BY DR. ALLEN H. SUGGETT, SAN FRANCISCO, CAL.

THE lingual expansion wire as perfected by the technic of Dr. John Mershon is the longest step in advance that has been made in the mechanics of orthodontia, since Dr. Angle offered the D Band and the expansion wire.

It is as big a leap beyond the appliances in use today as the expansion arch and D bands were beyond the plates and screws and ill-fitting bands in use at that time.

First, the materials for the bands are nearly perfect, made of iridio-platinum, which is so stiff and strong that it can be used as thin as 38 gauge and will spring over the contact point and fit as accurately as it is possible to fit a tooth that has not been trimmed.

Second, by following the technic, the whole appliance can be made on the model, thus saving the strain and worry of fitting bands to a resisting patient.

Third, it is constant in its pressure.

Fourth, it is clean and eliminates 95 per cent of the danger of injury to the teeth.

Fifth, it is out of sight.

At the first visit of the patient, take impressions as usual for your regular models. At the same time take another set of impressions for the models on which the appliances are made. Take these impressions just like the first ones except that you need only enough plaster to take the molars well and the lingual aspect of the rest of the teeth. You need pay no attention to the buccal surface of any of the other teeth as this model is to give the measurement for the molar bands, and the lingual surface of the other teeth for the fitting of the lingual wire.

When you get the models from these impressions, trim away the plaster or tooth on each side of the molar just down to the contact point but no farther. This is very important. Be careful to preserve the contact point for it is at this point that the wire measurement of the tooth is taken. If you obtain an accurate measurement of the molar around the contact point you have the only measurement required. This measurement is the largest circumference of the band. If you follow Mershon's technic carefully you will have a perfect fitting band. Take this wire measurement, lay it on the band material and make a scratch. As this scratch is the largest part of the band, extend this scratch across the band material on a slant making the other side shorter. Then cut the material off one millimeter longer than this scratch, but on the same slant. Lap the band to just cover the scratch and solder with 22k. The band then should go down on the tooth just to the con-

*Read before the Pacific Coast Society of Orthodontists, Portland, Oregon, Feb. 16-18, 1921.

tact point. Now shape the band with the contouring pliers which will give it the shape to slip over the contact point and fit the gingival portion of the tooth. Put the band on the tooth, the soldered side to the sloping side of the tooth, which is the buccal side of the lower and the lingual of the upper. Trim the tooth and push the band down to place. You should now have a perfect fitting band. If it is by chance too large, cut it in two near the original lap, lap again and solder. Follow Dr. Mershon's technic which is very clear on these points as to the fitting of the lingual wire and spurs, and you will have no trouble in constructing a perfect fitting appliance. At the next visit of the patient, they can be adjusted to the teeth in a few minutes and the patient dismissed for one month, with perfect assurance that the patient will be comfortable, the mouth clean and the appliance working every minute.

DISCUSSION

Dr. Chas. C. Mann, Seattle, Washington.—It is probably apt that I discuss this paper, inasmuch as I prepared a clinic on Mann's version of Mershon's technic, and have models for the purpose of illustrating that technic this afternoon. I have changed the technic as outlined by Dr. Suggett, in that I use coin gold instead of the iridioplatinum. His statement, however, that the materials for the bands are nearly perfect is probably correct. Personally, it proved a little imperfect in my practice, and I changed to coin gold, and use the technic to accommodate that material. Dr. Suggett takes these impressions in plaster. I, with several other men, use the new compound, furnished by the Supply Company of London, England. This material springs pretty nearly back into position when removed, provided its consistency is correct when it is used. Have the assistant manipulate the material until it is of the right consistency. The color when first obtained is yellow; after working to proper consistency it is a creamy white. Lately, I have been making use of partial impression trays for obtaining the impressions for the making of molar bands. Those trays are of two types; one for the upper and one for the lower. For the lower, I use Blue Island trays Nos. 80 and 81. With these trays I can get a definite impression of the molar teeth with no drawing, such as you have in making an impression of the whole denture. By the old method wherever the tooth is inclined lingually you will have a drawing on that side, but, as I say, with the use of the partial trays you will have practically no drawing in the impressions at all. Dr. Suggett says he trims the impressions to the contact point. I go beyond that point, cutting the tooth absolutely out of the plaster as nearly to normal tooth form as my knowledge of tooth anatomy permits. I make a wire measurement at the contact point of the tooth. In many cases you have broken down temporary teeth, sometimes permanent ones, approximating the mesial surface of the permanent molar. Then you have to utilize your knowledge of tooth form, in order to trim that tooth to its proper contour and produce your contact point. And so, I follow out the plan I have indicated. This was called to my attention by Dr. Baldwin of Spokane. The method is that followed by Dr. Mershon, to a great extent. Having made the measurements, we cut the gold to its proper width and bevel it at one edge, or cut off at an angle of say 45 degrees. Then the measure is made for the left band, laying the vertical cut to the left, and making measurement on the long portion of the band, and marking an inclined mark toward the left on the right side of the band, cutting a millimeter beyond that for the length of the band, and then soldering. I agree with Dr. Suggett in the reason he has given for the use of the lingual arch. I have found that finger spring is probably the biggest factor, and I am trying to work out the technic for the use of that spring. It is a difficult thing to master, but it will produce wonders in tooth movement. The work can be done almost without any disfigurement of the patient. We find in Seattle that patients like the lingual arch. Others like it, and we like it. I thank you.

Dr. R. S. Baldwin, Spokane, Washington.—I employ the method of taking two sets of impressions at the start, possibly because I am lacking in the 100 per cent efficiency of fitting bands on plaster models. I also take a third set of impressions for this reason. Just as Dr.

Mann has said, you sometimes have to assume approximal contacts and mesio-distal diameters, and cannot always make an accurate set of bands. When the patients come, I take the bands that were constructed on the models and fit them on the teeth. The bands may be a little too large or too small, so I open or close the seam as is required. Whenever you refit a band there is a slight change brought about which affects the mesio-distal position of the lingual tube, which is soldered in place at the time the band is made. So when the bands are accurately fitted in the mouth, I take another set of impressions in modeling compound with the bands on the teeth. Then I remove the bands from the teeth and set them into the impression just taken and run up the model. By this means I have the bands on the model exactly as they fit in the mouth. By making the arch on this model and carefully annealing it, and after transferring the bands from the model to the teeth and cementing them in place; you will obtain absolute accuracy in the adaptation of the arches in the mouth. This method may require a little additional time, but it gives the assurance that the arch as it is applied in the mouth is identical to the fit obtained on the model. In regard to carving teeth, it is acknowledged that a molar tooth on one side of the jaw should have the same mesio-distal diameter as the corresponding tooth on the opposite side. If the circumference of one tooth varies from the normal of the opposite side, select the more accurate tooth and make both bands from this measurement.

Dr. E. C. Read, Long Beach, Cal.—I have been using Dr. Mershon's technic with some modifications. I have been making bands directly over the teeth in the mouth, securing a separation at the first visit, then taking a measurement over the contact point, and fitting directly to the tooth at the second sitting. After fitting bands I take the impression, then place bands in the impression, and before pouring the model, I flow a thin film of wax around the inner side of the band, and after you have run the impression and made the models these bands may be removed from the model and yet they go back to place very accurately. After removing the band from the tooth you can take your time and solder the lingual tube, as you wish it. After placing back in position you are ready to trim and fit your lingual arch. I never succeeded in fitting bands over plaster models very accurately.

Dr. Mann.—I want to suggest to Dr. Read that the technic of making the bands on the models will save him more time in actual contact with the patient than he probably realizes now. I doubt whether I give in the full adaptation of two lingual arches more than an hour's time to any one given patient. That includes taking impressions, final fitting of bands, cementing, and adjusting the appliances. Of course, some time is required at the bench and by your assistant in the making of the model.

Dr. W. B. Dinham, Portland, Oregon.—Dr. Suggett's paper suggests this question: Why is it necessary to wait a month until the patient is seen again? I understand from Dr. Mershon's technic that the lingual wire should be adjusted and placed in the mouth in a dormant position, with no stress against the teeth until the patient becomes accustomed to the appliance. So, I do not understand why it is necessary to wait a month before an adjustment is made. I find a week's time is usually sufficient for the patient to become accustomed to your appliance, especially where there is no spring to the wire.

Dr. William C. Cavanagh, Portland, Oregon.—I am following nearly the same technic as Dr. Read. I prefer to devote an hour to the patient in the chair, and fit my bands to the teeth. If I were to use a metallic die I think I could make as good a fit over that, as on the tooth, but I have never succeeded in fitting bands to a plaster model as accurately as I can in the mouth. I follow Dr. Read's method as outlined in the use of a thin film of wax. This enables you to slip the bands on and off the tooth as often as you please in making attachments to the bands. I wish Dr. Suggett had some of my patients, and would put lingual appliances in their mouths and dismiss them for a month just to see what might happen. The advantage of the lingual appliance, as I understand it, is to conceal the arch. If I am granted the privilege of attaching a band now and then to the temporary canine so that I can anchor the expansion spring, so that the spring itself will not move gingivally or incisally, I will dismiss the patient for a month and take a chance. There is no place to rest that finger spring against a temporary canine, so that it will not be apt to slip one way or the other. I think we must take our patients into consideration; their nature, and how responsive they

are to suggestion, before we put on these lingual appliances. I do not think the nature of the patient will always permit the use of that appliance. I am not wedded to it.

Dr. Mann.—I want to go back to 1910, in New London, Conn., at Dr. Angle's meeting. He was discussing, and I was listening, as to how success came to a man in the practice of orthodontia, and, of course, being a young chap in the business, I was trying to get all the information I could, as to how I could succeed on the Pacific Coast. We were working on the plain arch. He said, "Doctor, you must combine with what we have given you in orthodontia, plain, ordinary, common sense."

Dr. Cavanagh.—Has anyone said we can get along without that with any kind of appliance?

Dr. Morehouse.—I would like to say a word in this connection. I had the opportunity of seeing at first hand Dr. Mershon's technic last year in the fitting of bands. Like the other two gentlemen, I either have not been faithful enough, or have not had patience enough, to work out the technic of that indirect method, as the dentist would call it. I have found I could fit the band just as accurately to the tooth, and I prefer to do so for more reasons than one. First, I do it, if for no other reason, because I like the contact with my patients, I like their sympathy and cooperation. I like to get in touch with them, and I do not think there is any better way than at the first one or two appointments with the little patients you shall spend the time in fitting bands. I think you have a far better opportunity to gain their confidence in this way, than by taking an impression and fitting the bands on the plaster model. After gaining their confidence you can do anything you please with your patients.

Dr. Mann.—The thing I have noticed in band technic is that with the most careful trimming of the model the final fitting has to be done on the tooth. Every band I place in the mouth has a final fitting on the tooth. The patient is called to the office, and the band is placed on the tooth and drawn tightly around to the gingival margin. It is then taken off drawn to the proper mark, and soldered. This method insures in my practice as perfect a fit around the neck of the tooth as I can hope to get. Dr. Morehouse speaks of gaining the confidence of the patient. In my experience the less I hurt them, the more I gain their confidence.

Dr. Baldwin.—There was a point made by Dr. Suggett, namely, that the patient be dismissed for a month. I had the opportunity some years ago of being in Dr. Mershon's office, and he impressed on me that with the lingual arch there is a great tendency to overtreat a case. The lingual arch is so constructed that it contains a great amount of latent force, and even at the first application, if it accurately approximates the teeth, you will get a response and just how long that force will continue to operate can only be ascertained by extended observation of the efficiency of the wire. The adjustments average from nine to fifteen a year; three weeks to six or eight weeks apart, according to the type of apparatus he uses, the number and position of finger springs, and the necessity for the movement. Dr. Suggett has made a good point, namely, that it is better to let the patient go two or more weeks, after the application of the arches before calling him in and adding to the force by further adjustment. When patients have been absent from four to six weeks, I have noted with surprise the result accomplished, and I have told them upon their return that they have done better out of the office than in it. So you must be careful and not crowd the force too much, as there is a lot of energy stored in the arch that will work out in time. As to making the bands on models, I found Dr. Mershon at one time went to the trouble of making metal dies. He gave this technic a thorough try-out, and I believe is now back to the plaster tooth, on which he fits the bands. The difference in results in bands fitted on the plaster tooth and those fitted on a harder material does not warrant following the more difficult technic required to produce a more permanent model. As Dr. Mann has suggested, technic and common sense will overcome many difficulties, and the work may be mastered in either hard or soft material.

Dr. Wentworth, Everett, Washington.—A great deal has been said about the method of making bands and the accuracy of them. Not much has been said about the accuracy of your impression. Dr. Suggett referred to prosthetic dentistry, and I will do the same. I put in two weeks with Dr. Tench in New York about two years ago. In order to get the fine lines

of the interproximal copies of the teeth and the gingiva he gets his model compound into working condition, and then holds it over a Bunsen flame, softening the surface, and tempering it before inserting it in the mouth. Thus the surface is so pliable he gets all the variations of the tissues more accurately than would otherwise be possible. Regarding the cooperation of your patient from the actual contact of fitting the bands in the mouth, I think the energy that the operator conserves in working indirectly more than compensates for loss of contact with patient, and if you want to get the confidence of your little patient from contact, adapt your bands after you have made them indirectly, and fuss around a bit and get acquainted, and gain his confidence in that way, instead of working for him all the time. They like to visit a little. Another point I will mention. I may be awkward, but if you will notice in fitting the shaft to the tube you have a lot of difficulty in inserting and removing it. Using your pliers to do this, as you do, you are likely to stretch your tube more or less. If you will use a little cold cream on the shaft you can remove and insert it easily.

Dr. Scott, closing discussion.—Much that is of interest has been brought out, and I would respectfully suggest to the program committee for next year that in order to straighten out some of these matters that every man bring a set of models, impressions, etc., to the meeting and let us find out how each man does his work. Some of the things brought out last year we have relegated to the scrap heap already. This technic, according to *Dr. Mershon*, is a simple thing, and I have the impression some of the men have not mastered it. The impression is taken in plaster. If there is a better impression material on earth than plaster I do not know of it. Now, to get the accurate measurement of the tooth, cut down to the contact point, so that the wire will go around the tooth at this point, and here you get your measurement. The band is made as long as that measurement. The tooth is not trimmed down, as described here this morning. This was pointed out last year at the San Francisco meeting. There is no particular reason for waiting a month for the second appointment, except to let your patient get used to the appliance. The appliances are put on very loosely and carefully at the start, so the patient will get used to them. We use the .036 gauge wires when it is to extend from first molars, but .030 when it extends only from baby molars.

Dr. Mann.—On the upper as well as on the lower?

Dr. Scott.—Yes; for finger springs we use the 020 wire.

Dr. Mann.—I use the 022, and 025 for finger springs.

Dr. Scott.—I see no reason for using the harder model substances on which to fit the bands. I believe it was *Dr. Kelsey*, of Baltimore, who advocated dipping the models in paraffin and putting talcum on them which gives a very nice surface. As to the matter of the shaft fitting the tube, where they are made to fit each other snugly, as they should do, we use a vaseline flux on the shaft which lubricates it enough to cause it to go into the tube.

Further discussion of *Dr. Suggett's* paper, by *Dr. Baldwin* of Spokane.

Another development I have been following is this: *Dr. Mershon* has modified the present shaft and tube with the acute angles on the flat edges, and has secured tubes beveled, so to speak, at the corners, so that there are no acute angles. You can refer to *Mershon's* modification of the shaft and tube in your order, if you wish to obtain these shafts and tubes with the rounded corners. If you request them fitted, the manufacturer will pumice them down so they will slide on easily.

A LATER TECHNIC FOR HANDLING IMPACTED CUSPIDS*

BY DR. HOWARD DUNN, SAN FRANCISCO, CAL.

THE presentation of this subject to you will be merely a brief description of a technic for handling impacted canines which differs slightly from the plan generally used. I lay no claim for originality of it.

The technic which I will present has a number of advantages—it will give us what we all try to avoid in our everyday practice; namely, (1) A tooth in position without mutilation. (2) It can be used in at least four out of five

Fig 1—Showing case of impacted canine in its original position taken at 3 angles to locate its exact position.

cases, which to my mind is a fair average. (3) No more force can be applied than is necessary to gain a physiologic tissue regeneration.

I will now take up the description:

The impacted canine is located by the usual radiographic methods ascertaining its relative position, aided by palpation. After the part has been anesthetized an incision is then made over the tooth. The tissues are then packed with gauze which has been dipped in a saturated solution of tannic acid in a compound tincture of benzoin. This compound has the effect of stopping hemorrhage, allaying the secretions which are most troublesome in this operation, and also acts as an anodine to the tissues as well as keeping the wound clean by sealing it. The gauze now placed is held in position

*Read before the Pacific Coast Society of Orthodontists, Portland, Oregon, February 16-18, 1921.

by means of a looped finger or auxiliary spring soldered to the labial or lingual wire according to the selection of the operator.

An impression is now taken of the opposite canine, if in place, and the patient dismissed for a day or two. A model is made and by means of the addition of a little plaster and by dressing and shaping, it is made to resemble the impacted canine. Reference to the radiogram will enable one to approximate it sufficiently.

If the opposite tooth is not in position a tooth from another model may be selected and trimmed or built up to resemble the impacted tooth or at least that part of it which is to be utilized.

Fig. 2.—Showing same case as Fig. 1 with cap in position and use of ligature attached to the labial arch.

Fig. 3.—Showing same case as Fig. 2 using lingual arch with auxiliary spring

Having the model prepared, a Melott's die is made, and a cap, only large enough for the angle or cusp is struck upon the portion analogous to that portion of the tooth to which the operator is to cement the cap. An eye or hook is then soldered to the top of the cap to engage the silk ligature or auxiliary spring.

At the next sitting of the patient, the dressing is removed and another placed for a day or two. Generally the tooth will be sufficiently exposed to enable the operator to cement the cap in position. If a little more exposure be desired packing around it with cotton pellets while the patient is in the chair will suffice.

The section of the tooth exposed is then dried by the assistant and kept

dry while the operator spatulates the cement. Here let me advocate the use of Ames' special crown and bridge cement.

If well spatulated on a large surface with a copious amount of cement it will give a very adhesive and creamy mass which will set rapidly when placed on the tooth—an advantage very much desired.

A point that I omitted is to take a small mounted stone and roughen very slightly the enamel of the tooth; this gives a better surface for the cement to adhere to as well as removing the investing membrane which covers an unerupted tooth.

A copious amount of cement is placed in the cap and the cap grasped by means of the Howe plier, engaging the eye or hook which has been soldered thereon. The approach must be such that the tissues will not interfere and such that the operator may have a firm and steady hold, as it is necessary to press the cap until the cement has set. During the setting the assistant should remove the surplus cement.

After the cement has thoroughly set, the wound is again packed and

Fig. 4.

Fig. 4.—Showing same case as Fig. 3. The cap in its relative position as seen here after the tooth has erupted through the soft tissues.

Fig. 5.

Fig. 5.—Showing another case with the cap and a portion of cuspid exposed.

the patient dismissed until the following day. At his return the operator may ligate the tooth to the arch with a silk ligature using only enough stress to remove all slack from the ligature. Allowing for the shrinkage is all the force necessary to bring these teeth into position. If preferred an auxiliary spring with slight pressure may be used in place of the silk ligature—the latter to my mind is as effective and much more cleanly. In cases where the impacted tooth lies exceedingly deep in the soft tissue this method can hardly be advocated.

It may be well to state that a second and sometimes a third attempt may be necessary before the cap adheres, but the time taken is nil when we consider the final result, with the tooth in position, not mutilated and with little or no chance for devitalization.

A few models together with x-rays will be shown later of cases under treatment demonstrating various stages of the technic.

I hope this will at least meet with your approval and consideration.

DISCUSSION

Dr. E. C. Read, Long Beach, California.—I do not think I can add much to the paper. The method as I see it is certainly unique, and should be useful if we can do it. The difficulty of the technic, I think would be to get a cap that would fit sufficiently accurately to these impacted canines to enable us to cement them to position. If you can do it you save mutilation, and there would be no objection to it, of course. The only difficulty is the time and trouble involved in securing it to place so that it will remain. In speaking of devitalization due to mutilation, I wonder whether we have not gone too far in inserting the pins, in drilling too large a hole, and drilling too deeply into the dentine. This is the method I have followed in a few cases in my limited experience. In these cases, I do not think any of you would see any danger of devitalization or that the teeth were in any sense mutilated. I use a soft gold pin of about 22 gauge, and when that is bent and cemented in place it need not go far into the tooth. You need not have the hole much larger than the body of a pin. With a small drill you can drill through the enamel and then with a small bur, drill to a depth of about one to one and one-half millimeters. The pin can usually be placed on the lingual surface of the tooth. If the tooth is so difficult of access that you cannot tell where you are drilling your hole, and do not know whether you are getting into the root or crown I do not know that there would be much advantage in the cap in such a case. I think if I wished to use a cap I would attempt to get an impression of the tooth with a pencil made from modeling compound and from the model thus secured would try to cast or swedge a cap. Dr. Engstrom will perhaps tell us something about this.

In regard to the use of the finger spring, Dr. Dunn has suggested something very nice for holding the packing in position. I have used the lingual arch for bringing these canines into position by extending an arm of 21-gauge wire over or between premolars to the buccal, and to that soldering a spring of .020 wire. This spring not only gives an opportunity for bringing the tooth downward, but also carrying it buccally to its position as you bring it down, by merely ligating or carrying the .020 wire above the hook on the canine tooth.

Dr. W. E. Newcomb, Cleveland, Ohio.—Like all of you, I assume, I have tried out in the last fourteen years numerous methods for moving impacted canines. The method I now use is original with Dr. Bowman, I think, at least he gave me the technic. It has been some years since I have used either a pin or cap on a canine in this work. The method necessitates uncovering the canine very freely. The molar bands to carry the lingual wire have been previously prepared, and after the canine is surgically uncovered the molar bands are placed on the teeth. The malposed canine is now plainly in sight. Then with a modeling compound pencil, sharpened, and a tray of modeling compound ready, the pencil of softened compound is pressed onto the exposed surface of the canine, and then the tray is inserted and forced home. This gives an impression with the bands in place, and a very definite impression of the canine to be operated upon. I have taken plaster impressions with satisfactory results. The form of the lingual wire depends largely on the location of the canine. Frequently I run it almost straight from one canine to the opposite first premolar, and simply get a finger spring down under and behind the canine, which can gradually be lifted and moved in the desired direction. Later on there is no objection to placing a cap on it if you so desire. In the first three to six months you can move it enough with the finger springs to greatly simplify the placing of a cap or band. When you lay down the appliance there is a very definite model of the canines, so that the finger springs can be accurately placed. I sometimes use a simple spring, but lately I have used a coil spring, soldered to the main body of the lingual wire, winding about it several times, using 24-gauge Aderer's No. 4 wire; as the canine area is reached the spring terminates in a "U" which engages the palatal surface of the canine. Pressure can then be applied by opening the coiled spring or by soldered extensions.

Dr. Engstrom.—I believe the method to be used should be determined largely by the position of the impacted or unerupted canine. The method of using the cap is indicated in specific cases. Dr. Read has partly explained the method I use in obtaining a close fitting cap. I am positive every time I make a cap that the cap is going to fit a particular portion of the tooth. It is somewhat of a guess. So it is often in drilling a cavity for the reception of a pin. In the deep-seated impactions that were mentioned by the essayist as being con-

trainticated, I find just the indications for the use of a cap. To make a close fitting cap an impression of part of the crown of the malposed tooth is taken. No other tooth can be used. An impression can be easily taken by the use of modeling compound in the form of a pencil, softening the end and pressing it to place. A die is made and a cap made from this die. In cementing that cap to the surface of the tooth it is necessary that the surface be clean, that it be as dry as possible, and be kept so. I have had no success in placing the cement in the cap only and then carrying the cap to the surface of the tooth, but I have had success in cases wherein I placed the cement on the tooth surface and in the cap also and then put the cap to place. I think this matter was taken up at the Eastern meeting in 1918.

Dr. Newcomb.—I might make a suggestion as regards the packing of the wound. It is necessary to hold the wound open a day or two. My most satisfactory results are obtained by a large pellet of cotton dipped in sandarac varnish. The sandarac gum is dissolved in grain alcohol. Thus you secure a sterilized solution, and the moment it strikes moisture it solidifies and forms a beautiful plug. In 24 to 36 hours you have a perfectly clean wound and one that is wide open.

Dr. Engstrom.—I have used a plug of gutta percha.

Dr. Newcomb.—Try the sandarac.

Dr. Engstrom.—I have, but have considerable hemorrhage upon removing the cotton.

Dr. Newcomb.—If you remove it in twelve hours that is true. You can leave it two or three days to better advantage.

Dr. Engstrom.—I use a piece of gutta percha, because it presents a smoother surface to the wounded tissue, and holds it in position with a wire extended from the arch wire.

Dr. Newcomb.—You do not need any spring at all.

Dr. Cavanagh.—I would ask Dr. Newcomb if in placing the spring around the canine he is ever troubled on readjusting the spring with the soft tissue growing over the canine? Is it ever necessary to reopen it and thus cause hemorrhage, etc.?

Dr. Newcomb.—I have had some soreness but never a hemorrhage. I do not conceive any particular disadvantage in removing the tissue there. If a tooth is away out of the course it will ultimately occupy a considerable amount of tissue may be removed palatally to the root of the central incisor. I have the oral surgeon remove this tissue very freely.

Dr. Allen E. Scott.—I wish to express my appreciation of Dr. Dunn's paper. It has taught me several things. Wherever it is possible to put a cap on a tooth I think that undoubtedly the proper procedure. I do not believe in drilling holes in these teeth if it is possible to accomplish the same thing in any other way. I do not like the idea of removing a large amount of tissue, such as Dr. Newcomb has mentioned. If it regenerated, all right, but if you move the crown out, and there is not enough tissue there to hold the root you are apt to get into trouble. I recall a central incisor where we operated, and put a pin in and drew the tooth down into place. We had the lingual surface where the labial surface should be, and we had to turn it all the way around. The tooth now is in proper position and has been turned entirely around, but the tooth is not a solid tooth. Whether it will ever be tight I do not know.

Dr. Dunn spoke also of roughening up the tooth with stone in order to make the cement stick. I would take exceptions to that. It is not necessary. You can roughen the band, but I do not like the idea of roughening the tooth. If the tooth is roughened up much it leaves it open to the liability of decay.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

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TREATMENT OF A DENTAL ABSCESS*

BY A. R. MENZIES, D.D.S. (PENN.), L.D.S., R.C.S. (EDIN.), L.D.Q. (QLD.),
BRISBANE

I AM here at the invitation of your Society, extended to the Odontological Society, for one of its members to read a paper on some subject of mutual interest.

It gave great pleasure to the President and members of our Society to receive the invitation, which was immediately accepted.

At the President's request I undertook to write the paper, the subject matter of which is the treatment of a dental abscess.

This subject has been repeatedly threshed out in every dental society for the past few years and it is only presented to you tonight because it was one of the subjects suggested to us in your letter of invitation. Hence no apology is necessary. I trust that the discussion which I hope will ensue, will be instructive to us all.

I have purposely left the paper with a great deal to be said and would be glad if other dentists present would add any particulars of special interest.

In presenting this paper to you I am taking up the attitude that a great deal of the subject matter is common knowledge to both the medical and dental professions, therefore I have purposely omitted a great deal of the fundamentals, such as detailed descriptions of anatomy, pathology and the allied subjects, as it would only be an infliction and tend to weary you. Consequently, if my remarks appear to lack a great deal of these details, I would have you remember that I consider them as understood.

Abscesses originating on teeth are invariably considered by the medical fraternity as a purely dental matter and as such are quite rightly referred to the dentist for attention. It is only within the last few years that the medical profession has attached any importance to this pathologic disturbance, fol-

*Read at a Combined Meeting of the Queensland Branch of the British Medical Association and the Odontological Society of Queensland on October 1, 1920.

lowing on the researches and writing of some of the most prominent members. When a patient presents himself for medical examination, the doctor usually inspects the teeth and, provided he is unable to diagnose the particular ailment and he thinks the teeth may have something to do with it, he refers the patient to the dentist to see if the latter can discover anything wrong. Numerous eminent medical scientists, as Hunter, Rosenow, Mayo, etc., have been for years writing and lecturing on the dangers of focal infection and calling special attention to the oft overlooked one of dental origin, hence it is not surprising that your Society is anxious to have a discussion on the subject.

Dentistry in the past has been a profession in which manipulative dexterity has taken precedence over a knowledge of pathology. This accounts for the too frequently observed and sometimes brilliantly constructed pieces of restoration, covering and very frequently causing a state of pathologic iniquity unparalleled in the realms of surgery. But it is only just to the dental profession to state that its members are now just as fully alive to the mistakes of the past as the doctors and are anxious to convince the medical profession that dentistry of the future will be for the betterment of humanity, seeking out efficient methods based on strictly scientific knowledge.

Hunter, after years of research work, felt it his duty to step into the breach and call a halt to oral sepsis; the dentists have responded to his appeal.

It is not my intention to inflict a description of a dental abscess upon you, being well aware that that is a part of your professional knowledge, beyond the statement that I wish to draw your attention to the fact that there are at least two kinds of abscesses associated with the teeth. The more common variety is caused by infection from within the tooth and is known as an alveolar abscess. The second, known as periodontal abscess, is situated upon the specialized periosteum of the tooth (the periodontal membrane). It is caused by irritation and infection carried to this bone membrane by the circulation in patients of gouty diathesis.

ALVEOLAR ABSCESS—ETIOLOGY

The exciting cause of an alveolar abscess is always a bacterium and its toxins conveyed *via* the interior of the tooth itself to the alveolar process. The predisposing causes are many: infection of the pulp and consequent death from caries, exposure of the pulp to the salivary contents either by caries or accidentally or intentionally inflicted, insertion of metallic fillings in too close proximity to the pulp, death of the pulp from chemical or thermal agencies, operation within the pulp canal in an attempt to clean it without regard to strict surgical asepsis, remnants of a dead pulp left within the canal, insertion of imperfect root fillings, the forcing of dead or putrescent pulp material through the apex of the tooth, involvement of a root from an adjacent tooth already suffering from an abscess. It may have a fistula and discharge into the oral cavity usually at the point of least resistance, or it may be of a type known as a blind abscess. An abscess may be either acute or chronic.

When the abscess has a fistula it is, as a rule, easy to locate, but it is not always wise to condemn the tooth over which the fistula appears, as it some-

times happens that an abscess discharges its contents at a considerable distance from the affected tooth, sometimes over a healthy one. The abscess with a fistula is the least dangerous type, as it discharges its contents into the mouth and is either expectorated or swallowed. This, of course, is bad enough, as it may cause alimentary disorders of various kinds, but the point I wish to bring out is that on account of the fistula the presence of an abscess is made known to the patient and dentist, consequently it is more likely to receive proper attention. It is the blind abscess, or, as it might aptly be described, the abscess "of internal secretion," which is the most dangerous and undoubtedly the cause of most of the troubles which can with accuracy be laid at the door of dental focal infection.

The toxic material is absorbed into the circulation and its effects are observed in many diseases of organs and tissues, the number of which is steadily mounting up as research work progresses. That "abscessed" teeth can be the cause of disease in other parts of the body is now generally accepted, but the debatable point is: Do all "abscessed" teeth cause metastatic infection in some other part of the body? My contention is that all "abscessed" teeth may cause infection, some immediately and others as opportunity occurs.

An "abscessed" tooth may be dormant for years and suddenly break out with startling results. Sometimes we observe patients with numerous abscesses and a septic condition generally, who otherwise appear to enjoy good health. Again, we observe patients with only one tooth seat of trouble, whose general health is completely disorganized thereby. The different theories advanced on the subject, immunity and susceptibility, are usually quoted to cover this. A great deal depends on the original health of the patient and the virulence of the organisms present. Certain organisms possess peculiar selective properties for certain tissues and organs of the body.

Sir William Hunter is very emphatic in his contention that "abscessed" teeth and oral sepsis generally do cause general infection resulting in a number of diseases, some of which previously had been of unknown origin. He says:—

My clinical experience satisfies me that if oral sepsis (and naso-pharyngeal) could be successfully excluded, the other channels by which "medical sepsis" gains entrance to the body might be almost ignored. Sepsis as an important and prevalent cause of disease in medicine would almost cease to exist, instead of being as in my judgment it is at the present time, a more important and prevalent cause of disease in the domain of medicine than it is in that of surgery.

Later on in his article, referring to gold crowns, etc., placed over roots, he says:

I speak from experience. The worst cases of anemia, gastritis, colitis of all kinds and degrees, of obscure fever of unknown origin, of purpura, of nervous disturbances of all kinds ranging from mental depression up to actual lesions of the cord, of chronic rheumatism, of kidney disease are those which owe their origin to, or are gravely complicated by, the oral sepsis produced in private patients by these gold traps of sepsis. Time and again I have traced the very onset of the whole trouble of which they complained to a period within a month or two of their insertion. The sepsis hereby produced

is particularly severe and hurtful in its effects, for it is dammed up in the bone and in the periosteum and cannot be got rid of by any antiseptic measures which the patient or the doctor can carry out. Moreover, it is painless and its septic effects therefore go on steadily accumulating in intensity without drawing attention to their seat of origin.

CLINICAL EFFECTS OF SEPSIS

The chief feature of this particular oral sepsis is that the whole of it is swallowed or absorbed into the lymphatics and blood. Unlike the sepsis of open wounds on the outside of the body, none of it is got rid of by free discharge on the surface. The effects of it, therefore, fall in the first place upon the whole of the alimentary tract from the tonsils downwards. These effects include every degree and variety of tonsillitis and pharyngitis, of gastric trouble from functional dyspepsia up to gastritis and gastric ulcer and every degree and variety of enteritis and colitis and troubles of adjacent parts, *e. g.*, appendicitis. The effects fall in the second place upon the glands (adenitis), on the blood (septic anemia, purpura, fever, septicemia), on the joints (arthritis), on the kidneys (nephritis) and on the nervous system.

The most intense anemia, blood poisoning, hectic fever and even ulcerative endocarditis may be produced by one deep-seated alveolar abscess. On the other hand, a man may have the foulest sepsis for years without apparently any ill effect, but he need not vaunt himself unduly upon this comparative immunity. Sooner or later his sepsis will find him out. For even if it does not itself produce definite disease of its own, it will certainly complicate any independent disease from which he may afterwards suffer and its effects, although unrecognized, may really constitute some of the most prominent features of his disease.

Both medical and dental journals have for some years been carrying on a crusade against oral sepsis. I know you are all well posted on this subject and I daresay you have all seen typical cases which undoubtedly have had their origin in oral sepsis and which have cleared up in an almost miraculous manner by simply extracting the offending teeth. If this success were repeated several times, it would tend to make you an advocate in the extraction of teeth whenever in doubt. The physician and surgeon are and have been for some time gradually adopting the attitude that retention of teeth is not absolutely necessary, especially when it comes to a matter in their opinion of deciding between the retention of bodily health and the retention of the teeth. They gradually and perhaps unconsciously come to value the teeth less and less.

The dentist, on the other hand, has been brought up and trained to save teeth in every possible way. The value of teeth to the patient has been drilled into him until he looks upon an extraction as a serious affair, due to ignorance on someone's part. In his attempt to save teeth, the dentist devised and carried out dental operations which occasionally resulted in various pathologic conditions and their consequent sequelæ. It is really these two almost divergent views held respectively by medical and dental practitioners, which in reality have brought on the study of oral sepsis and which are tending to

unite the two professions in a joint attempt to strike a middle course. The medical men have pointed out the evils of bad dentistry; as I previously stated they are gradually assuming the unimportance of retaining teeth of doubtful utility and the dentists are trying to perform dental operations which will retain teeth in healthy condition and thereby convince the medical man that it is not always necessary to extract when in doubt. It took the dental profession some time to realize that their conservative dentistry of which they had been so proud, had in reality been causing havoc to the general health. It was only by hearing and reading repeatedly of cases which had been conclusively proved to be caused by misplaced dental efforts, that a general effort is being made to perform dental operations which, like Cæsar's wife, "are above suspicion."

You no doubt would like to hear something of the methods the dental profession is taking to cope with the evil. As in everything, "prevention is better than cure." Dentists are now aiming at preventive methods. A dentist hesitates now-a-days before he opens a healthy tooth to remove the pulp in order that the devitalized tooth may be used as an attachment or abutment for retaining a mechanical appliance. He realizes that a great many of these teeth, which before they had been interfered with were perfectly normal, may later become the sites of abscesses and that the chances of performing the operation successfully are really more or less doubtful. Therefore he gives the matter serious consideration before interfering with a healthy pulp. Every dentist will tell you that he does less and less interference with healthy pulps as time goes on. Then, again, patients who make regular visits to their dentist who value their teeth, rarely find it a necessity to have pulp removed from their teeth, either healthy or otherwise. This preventive dentistry, when it can be properly carried out, comprises regular cleaning of the surface of the teeth and filling of cavities as they appear before they assume a large size. The occasion for pulp removal and consequent abscess formation rarely occurs, so that if everyone could be treated in this manner, there would be no need to fill roots or to treat abscesses. We all know that it is asking a little too much of human nature to expect everyone to conform to this counsel of perfection and so, like the poor, decayed and abscessed teeth and oral sepsis will be always with us. It therefore becomes necessary to devise and carry out correct methods of treatment.

The primary object of dentistry is to maintain the teeth in a healthy and useful condition. Decay must be prevented as much as possible by prophylactic methods. When decay does occur, early removal of the decayed portion and correct filling is necessary, so that exposure of the pulp may be prevented. When a patient presents himself with an exposed pulp, it is necessary to carry out operative methods to remove the pulp and to fill the root in such a manner that infection beyond the actual pulp canal does not take place.

These are briefly the prophylactic or preventive methods adopted in dentistry to maintain the teeth in as healthy a condition as possible. When an abscess has developed, various methods are advocated for dealing with it; these will be taken up later. In this paper it is not necessary to deal with

any of the preventive methods except that of preventing infection consequent on exposure of the pulp. A healthy pulp removed under strictly aseptic conditions, the root canal correctly prepared and a filling inserted which seals every part of the canal to the foramen should remain in a healthy condition throughout life. It should be borne in mind that this is not a "dead" tooth, because it still receives nourishment from the periodontal membrane, although the pulp has been removed. It is mainly because the operation of removing the pulp and replacing it with a suitable filling has not been carried out in a surgically aseptic manner, befitting the importance of the operation, that so many abscesses develop.

Then, again, when the pulp has been infected before removal, it is natural to infer that the tooth structure is also infected, as the dentine which encases the pulp is one mass of minute tubuli filled with an organic material.

Various methods have been advocated for sterilizing the tooth structure after the removal of an infected pulp, but the success of any of them is only in proportion to their penetration of the tooth structure. None so far has been shown capable of completely sterilizing the dentine *in situ*. To quote Prinz: "An incipiently infected root canal cannot be sterilized permanently by the antiseptic methods of treatment now in vogue. To completely sterilize an infected tooth root—basing our conception upon our present knowledge of antiseptic action—implies removal of the tooth bodily and thoroughly boiling it."

At the most, partial sterilization of the canal to a very slight depth takes place, but infection lies just beyond this line of demarkation. Test cases have been taken under various methods of treatment which show negative results to scrapings taken from within the canal for various periods after the institution of the treatment. But when the tooth has been extracted and ground up, virulent cultures were invariably obtained, showing that by any methods advocated the tooth remained more or less septic. This point should be borne in mind. Prinz holds that the great majority of reinfections may be explained upon the basis that the infective organisms have remained undisturbed within the body of the tooth structure and have escaped destruction during the alleged process of sterilization.

Arthur D. Black states that the percentage of abscesses for all root fillings was 45; for good root filling 9; for poor root filling 63. To Black it seems that no better argument could be found to induce dentists to be more painstaking in their root filling technic, for here is the opportunity to reduce the total alveolar abscesses to about one-fifth of the present number.

This examination by Black shows that for every 100 teeth which undergo the operation of root filling, abscesses develop in 45. This certainly is startling if we are to consider that the chances when a root is filled are equal whether there will be abscess formation or not. But his other figures which show that in 63 per cent of roots imperfectly filled abscesses arise, must impress everyone that there is no room in dentistry for poor root fillings. His remaining figures show that after apparently good root fillings abscesses develop in 9 per cent. This is probably accounted for by the fact that, although they appear to be perfectly filled, strict aseptic principles were not

rigidly carried out. A consideration of these figures would lead to the conclusion that this method certainly does not come under the heading of preventive measures. Results like these figures imply have caused a wave of intense feeling to spread through the dental profession; some dentists have stated that, provided a pulp has to be removed or a root filled, the tooth had better be extracted, as the chances of it doing more harm than good are too great. I think the better attitude to take up would be to improve the methods of root filling and thereby gain at least 91 per cent of successes.

The next question to be dealt with is whether it is advisable to retain or extract a tooth with an abscess on it. There is much diversity of opinion still on this subject, some holding that the patient should not be permitted to take the risks consequent on retaining a tooth with an abscess on it, others holding the opinion that an abscess can be successfully treated and the tooth retained in a useful and harmless condition. There are various methods of treating a dental abscess with the object of retaining the tooth. One of the first rules of surgery applies here, *i. e.*, establish efficient drainage. The drainage may be by way of the interior of the tooth itself (the pulp canal) or through a fistula, either existing or made for the purpose.

When the dentist considers that it is sufficiently drained, he usually attempts to sterilize the tooth and the abscess cavity by means of drugs, but as I pointed out earlier in this paper, it is impossible to sterilize a tooth completely *in situ*, therefore his efforts are only partly successful. He usually succeeds in making the tooth comfortable and useful, but undoubtedly the infected area is only lying dormant ready to spring into activity whenever the patient's vitality is at all lowered. It is only right to point out to the patient that an attempt is being made to retain the tooth in as useful a condition as possible, but that at any time he may have to lose it; he may then take the risks with his eyes open.

When an abscess develops on a tooth, that portion of the root situated in the abscess area is bathed in pus, is denuded of its periosteum and consequently may be considered as necrosed, the surface begins to be absorbed, leaving a very rough and uneven portion projecting. Even when the pus has been drained away and the area washed by suitable antiseptics, this necrosed portion of the root still remains as a foreign and highly infected body. With the object of removing this portion of the root after the rest of the tooth has been treated, the operation of resecting the apex has been introduced. Under as aseptic conditions as possible, the gums overlying the affected root are anesthetized by any of the several methods now in vogue and the gum opened and laid back, the outer plate of bone covering the root removed, with the periosteum previously peeled off, the necrosed portion of root usually about 1.5 mm. in length resected, the abscess wall curetted, then washed, etc., the final treatment varying from nothing at all to repeated packings every 24 hours until the cavity closes. This is, in my opinion, the most satisfactory treatment, but it must be borne in mind that the root is still infected and therefore its days are numbered. It is only advisable to perform this operation on the anterior or single-rooted teeth, as the risks of serious injury are too great for the dentist to attempt it on any of the multirooted teeth with rare ex-

ceptions. If only one root of a multirooted tooth is infected and the remaining root or roots are sufficient to retain and maintain the tooth in position and good condition, then the whole infected root may be resected and extracted, leaving the tooth supported by the other healthy roots. As a general rule it may be stated that any of the posterior teeth developing an abscess should be extracted, as it is practically impossible to treat them successfully; with regard to the anterior teeth, it is a case of "circumstances altering cases." When the rest of the teeth are in a bad condition and have to be extracted, then there is no need to attempt to retain it, or when, owing to the number, position and condition of the remaining teeth being unsatisfactory, extraction is advisable. In fact, it is usually advisable to extract it. But sometimes it occurs in the mouth of a person when the loss of a front tooth would occasion considerable distress and inconvenience. An attempt to retain the tooth under as tolerant conditions as possible would then be justified. A dentist hesitates before removing a tooth, especially a front one, when the patient still retains a full normal set, or when the removal of a tooth necessitates the wearing of a plate. These are all circumstances which influence the dentist and patient in taking chances. But when the patient is suffering from a disease which can have its origin from a dental abscess and which the physician or surgeon is confident is a probable cause of the trouble, than no consideration whatever should influence the dentist to leave the tooth in the patient's mouth.

DIAGNOSIS

Diagnosis of a dental abscess when a fistula exists or when excessive swelling is present, is an easy matter. It is in the case of the so-called blind abscess that a careful diagnosis has to be made. It is here that x-rays have played such an important part in dental diagnostic work. The doctor suspects the teeth after eliminating all other foci of infection and sends the patient to the dentist to be examined by x-rays. When it is a case of chronic alveolar abscess, the abscess area is radiolucent and shows up in the negative as a black spot on the root, but often in acute abscesses there is not sufficient rarefaction to cause this radiolucence; hence the negative result is not always conclusive. Again, what apparently appears to be an abscess on a tooth is sometimes a natural cavity thrown into the negative resembling a radiolucent area. Therefore, great care and experience is necessary in taking and reading x-ray pictures of the teeth. The experience gained by the earlier operators in x-ray work has been taken advantage of by the manufacturers of x-ray apparatus and at the present time special machines for doing purely dental x-rays are being supplied to dentists in thousands. To a certain extent they are still looked on as a luxury by dentists, but before very many years have passed they will be looked on as a necessity, just as the electric dental engine is now. When the skiagram fails to show an area upon the suspected tooth, other means of diagnosing are at the dentist's disposal. He may test the tooth for vitality by the electric current. If it is unresponsive, he may then open up the tooth and see the state of the interior. If the root is filled and

he still suspects the tooth, he may remove the filling and attempt to obtain a culture from the apical area just beyond the root.

All crowned teeth should be suspected, even if they do not show any radiolucent areas in the negative. Dr. A. Corton, of Trenton, New Jersey State Insane Hospital, has given up examining crowned teeth or bridges by x-rays, as after taking over one thousand he had not found a percentage large enough to justify the cost of films. He orders all crowned teeth to be removed.

I have been asked to say something on the subject of attention to children's teeth.

Nature supplies the children with a deciduous set of teeth to be used and retained until the permanent ones replace them. It is the dentist's duty to assist Nature in an attempt to retain these teeth in as healthy and useful condition as possible. The mother should instruct the children to cleanse their teeth regularly and when decay occurs or before, if the mothers are wise, they should be brought to the dentist and have any decay removed and suitable fillings inserted. Abscesses form in association with deciduous teeth more readily than in association with the permanent ones, hence it is imperative that all cavities should receive early attention and the exposure of the pulp should be prevented.

Dental work for children is certainly not looked forward to with any pleasure by the average dentist, partly because the children have not sufficient intelligence to value the work being done for them, partly because the child is very often spoiled and partly because the dentist has not acquired the knack of handling children properly. Certainly in most cases the dentist is not able to do dental work of the highest order. His main desire should be to keep the child comfortable and free from pain and abscess formation until he is able to do work of a more lasting nature.

When an abscess does develop (for it is generally this state of affairs when the dentist first sees the child), it is again a matter of circumstances altering cases. Very often the child is suffering intense pain; therefore the only humanitarian thing to do is to extract the tooth. But sometimes a fistula has developed and the tooth does not trouble the patient. In this case the view is held by many that it is unnecessary to extract the tooth, provided the mother keeps the discharge wiped away. The object in retaining such teeth is to secure a space for the succeeding permanent tooth. If the tooth were extracted, the space would close up, owing to the increase in size and number of the permanent teeth and consequently the successor to the extracted tooth would take up an incorrect position in the arch. It is rather a doubtful procedure. Many dentists extract the deciduous teeth when abscesses appear and consider the health of the patient of more importance than the regularity of the permanent teeth. Various writers state that children are not so liable to metastatic infection from abscesses around the teeth as adults are and consequently the matter should not be viewed with such alarm.

I should like to emphasize what apparently seems a little understood dental fact. Many mothers are totally unaware that their children have a permanent tooth at 6 years of age. I know that a good many doctors find a great difficulty in remembering the dates of eruption of the teeth; I am there-

fore seizing the opportunity to remind you that the average child erupts the first permanent molar at from 5½ to 6 years of age and that this tooth comes in while all the first set are still in position and does not replace any of them, but comes in immediately behind the first set. We dentists are weary of the sight of mothers bringing in their children to have this tooth extracted, thinking all the time it was a temporary tooth. The doctors have greater opportunity of seeing the parents and children about this age in their homes than the dentist has, because it is often too late when he sees them. It would be a blessing to everyone concerned if the doctors would point out this fact.

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ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Remote Manifestations of Focal Dental Infections. R. Fernandez. Philippine Journal of Science, 1920, xvi, No. 1, p. 89.

The author emphasizes the great importance of chronic disease of dental roots for the origin of rheumatic joint affections, neuralgias, and numerous other organic diseases, upon the basis of the literature and ten personal observations. Root abscesses and pyorrhea alveolaris are especially significant in this connection. The former do not necessarily give rise to clinical manifestations, so that in certain cases a careful x-ray examination is required for their discovery. Photographic plates of suitable dimensions may be adjusted intraorally for this purpose, but as a large number of pictures is needed for a complete examination, the extraoral method is recommended, with which five pictures are sufficient. A dark shadow at the tip of the root is proof of the existence of an abscess, also when other symptoms are absent. The pathogenic agent of these chronic inflammatory processes is the streptococcus viridans, in the great majority of the cases. Aside from local treatment, the repeated injection of autovaccine (30 to 100 millions streptococci) is urgently recommended.

Focal Infection in the Head and Its Relation to Systemic Disease. C. F. Yerger. Illinois Medical Journal, 1920, xxxviii, No. 6, p. 509.

The most frequent focal cause of systemic infection is dental infection (25 to 90 per cent). The presence of dental focal infection is easier to diagnose than any other on account of the great aid given by the x-ray. There are two general sources of infection about the teeth, namely, blind abscess (apical abscesses or alveolar abscesses) and pyorrhea alveolaris. Pyorrhea is usually self-evident. All crowned and bridged teeth, devitalized and filled teeth, should be looked upon as greatly suspicious, until proved otherwise by x-ray films. A comprehensive dental report with x-ray findings should be made a part of each record whenever there is suspicion that the teeth may be the source of infection. Aside from prophylactic measures, active treatment consists in the elimination of the foci of infection by operative removal, although many cases are known to recover without the removal of the ap-

parent source of focal infection, after prolonged treatment. But these cases are especially apt to relapse and recur, thereby jeopardizing the health and future welfare of the patient. It cannot be too strongly emphasized that there is never any justification for permitting the continued presence of any recognizable focus of infection, which may immediately or subsequently have a direct etiologic relationship to some serious disease and thereby compromise the individual's health or even life itself.

From the historical viewpoint, it is of interest to note that in 1801, Dr. Benjamin Rush noted the clinical relationship between dental focal infection and arthritis; he recommended the extraction of an abscessed tooth in a case of arthritis of the hip, which resulted in an immediate cure. In 1875, Dr. John W. Riggs, a dentist of Hartford, Conn., called attention to pyorrhea alveolaris as a cause of systemic disease. The subject of focal infections was placed on a permanent scientific foundation by the pioneer work of Billings and Rosenow (1909).

Dental Foci, an Etiologic Factor in Systemic Disease. A. H. Ehrenelou and B. F. Loveall, U. S. Naval Medical Bulletin, 1921, xv, No. 1, p. 109.

Infectious foci located at the roots of teeth still often remain undetected, or even unsuspected, despite the growing recognition of their frequency by medical and dental men. Even after search, many offending teeth are passed by because of their apparent harmlessness; but an apparently sound tooth may nevertheless be productive of serious damage. By their peculiar relation to bone tissue, teeth present a direct avenue for bone infection. Every devitalized tooth, every crown, and in fact, any kind of artificial work on the teeth should be considered as a potential focus of infection unless proved otherwise by accurate technical means and procedure. The diagnosis should not be made from x-ray findings alone. The electric current and transillumination are valuable aids to determine the vitality of questionable teeth. Bacteriologic study will confirm the x-ray findings. As regards the correct interpretation of the pictures, a close study must be given to the white line made by the compact plate (peridental lamellæ) of the alveolus or the translucency of the peridental membrane. If this white line is followed carefully, it will be continuous, with only slight variations, around the whole root when in correct anatomic relation. But when there is disease present, it will appear first unduly thickened and then broken or obliterated. In this way both apical or gingival pathologic areas may be studied and diagnosed. In cases of long standing the wall of the abscess becomes dense in an attempt to wall off the infection. If there is no definite wall, the adjacent bone is becoming infiltrated and liquefied. When walled off the area is cystic, while in the latter case a granuloma of indefinite size or shape is formed. Around old devitalized teeth there are often seen heavy calcified areas which have been shown to be hypertrophic, due to continued stimulation by slowly progressing infection. Sections of this bone have proved to be bacteria-laden and are interpreted by some as foci of infection. The most thorough and positive treatment is surgical. Whether latent or acute, these local conditions should be treated as soon as discovered, since by acute infections the lowering of the general body

resistance may allow them later to associate their disease-producing power and in time cause long-standing chronic ailments. In this manner a vicious cycle easily becomes established in which an acute infection becomes the inciting factor.

The treatment as conducted by the authors, members of the Medical Corps and the Dental Corps, respectively, United States Navy, was guided by the axiom that the dentist's field primarily is the conservation of teeth to fulfil their intended physiologic function; only when their retention was a menacing factor to the general health, were radical measures adopted. No temporizing in serious cases should be considered. The cases quoted by the authors received no treatment other than the removal of dental foci, and none was indicated, as shown by the very instructive case of a young seaman 22 years of age, with acute inflammation and swelling of left knee and ankle joints. The tonsils had been removed some time previously, and the teeth appeared sound but radiograms showed marked granulomata at apices of upper right first molar, first bicuspid, and upper left first molar; these teeth were extracted and alveolus curetted. Swelling, joint tenderness and pain rapidly subsided so that patient was discharged to duty in two weeks.

Observation on Dental Therapeutics Based on Clinical and Roentgen-ray Investigations. W. M. Fine. New York Medical Journal, 1920, iii, p. 668.

In the author's opinion, too many teeth are extracted with a view to curing some obvious systemic disturbance, including that of the nervous system. For a few years past, he has witnessed the wholesale extraction of teeth, without noting a recovery from many of the diseased conditions attributed to the teeth. The successful demonstration of the same microorganisms in pulpless teeth and in arthritic joints does not necessarily mean that the teeth are the primary cause of the infection in all cases, without exception. On the contrary, the evidence rather points to the systemic disease as being responsible for the dental disturbance, although it is true that the extraction, or restoration to health, of badly decayed or abscessed teeth removed a contributory factor in many diseases, and also true that many diseases can be traced directly to mouth infection. Nonvital teeth should not be unconditionally removed, for the loss of the capacity of proper mastication of the food involves a greater danger than that arising from a correctly treated dead tooth. It is doubtful, moreover, whether all the clear areas shown by radiograms of dead teeth are abscesses, and if this is not the case such teeth should not be ruthlessly extracted. Bone-absorption may easily be produced by forcing filling-material through the end of the roots, or by drugs used in dentistry, such as creosote, oil of cloves, or carbolic acid, resulting in the production of a clear area, and it is highly probable that seventy-five per cent of such areas have been caused by such operative technic or perhaps by a defective film. When the radiogram shows a liquefaction of the tissues, it is a plain duty to open and drain, and when there is a great deal of destruction of bony tissue due to the abscess, it necessitates extraction. There are teeth that cannot be successfully operated upon, and canals that cannot be found or opened. Such teeth must be removed when they become the seat of infection.

Giant-Cell Sarcomata of the Jaws. L. Krebs. *Correspondenz-Blatt für Zahn-ärzte*, 1920, xxxvi, p. 27.

According to their histologic composition, the giant-cell sarcomata of the jaws belong to the true sarcomata, but according to their clinical course, to the benign tumors of the buccal cavity. In conformity with their localization, they have long been designated as epulides, meaning noninflammatory tumors of the gums and alveolar process. Recently, the name of epulides is essentially reserved for sarcomata and fibromata at the alveolar margin, whereas other tumors are directly designated by their pathologic name. The description of a tumor as epulis is desirably qualified by the addition of an appropriate adjective, such as sarcomatous or fibromatous epulis; the mere designation as epulis being only topographic. The giant-cell sarcomata of the jaws occupy a peculiar position on account of their benign course and the absence of metastases. The clinical picture of periosteal giant-cell sarcoma is as follows: The tumor usually appears at the margin of the gums, on the outer side of the jaw, but is occasionally lingual or palatal. The growth may be attached by a broad base or it may be pedunculated. Sometimes, the tumor grows out of the alveolus of a tooth, as the sequel of an extraction; in other cases, it is situated between the teeth, which it loosens through its increase in size, pushing them out of position. Impressions of the teeth are often demonstrable in the tumor as soon as it has reached sufficient size to be struck by the teeth of the opposing tier, or when it extends towards the neighboring teeth. These dental contacts result in lesions of the mucosa which may produce ulcerative disintegration of the surface. Swelling of the regional lymph glands is usually referable to this ulcerative disintegration of the mucosa. In highly vascular tissues, hemorrhages are apt to originate. The consistence is usually thick, sometimes of bony hardness, in the presence of much interspersed bone-tissue. The more vascular the tumor, the softer its consistence. The subjective disturbances are at first inconsiderable. In case of rapidly progressive growth of the tumor, the patient is hindered in chewing and talking; when the tumor is of considerable extent, it may give rise to more or less disfigurement. The ulcerated surface of the mucosa may become extremely distressing when it begins to break down and to suppurate. The shape of the tumor is usually oblong; the size varies from that of a cherry to a hen's egg; the color is brownish to reddish-brown, the latter color pointing to the presence of pigment.

The differential diagnosis between giant-cell sarcoma and other tumors is sometimes rather difficult, the following affections entering into consideration: (1) Fibroma. (2) Abscesses, due to periodontal inflammations. (3) Exostoses of the Bone. (4) Other types of sarcoma. (5) Odontoma. (6) Cysts. (7) Carcinoma. The microscopic examination is decisive. In the author's material, the lower jaw was more frequently affected than the upper (59 as compared to 66 cases). According to his statistics, the seat of predilection of the tumor is the bicuspid region; but the majority of the growths were large, extending over several teeth. The statistical findings are to the effect that the tumor preferably appears in the twentieth to fortieth year, more frequently in women than in men; it is found more often in the

lower than in the upper jaw; the sites of predilection are the bicuspid and molar region.

As in the method of treatment of giant-cell sarcoma, extensive extirpation enters into consideration. The prognosis is favorable, provided the parent soil, periosteum and bone of the alveolar process, is removed to a sufficient extent, and provided the recent cicatrix is not irritated through premature application of a prothesis. Local recurrences, frequently mentioned in the literature, are probably due in the majority of the cases to incomplete removal of all diseased tissue. In the author's material of 125 cases, recurrences were observed only in isolated instances, altogether three in number. A personal observation concerned a man 49 years of age, with a sarcoma of the left lower jaw, composed predominantly of spindle-cells and also containing giant-cells. The principal focus corresponded to the periosteum; the bone contained in the tumor was in part a remnant of the old bone, in part there was a new formation of bone. The case was accordingly one of periosteal sarcoma. The tumor was partly movable and attached by a broad base in the region of the wisdom tooth, which was removed together with the sarcoma.

Interstitial Gingivitis or So-called Pyorrhea Alveolaris: An Incipient Form of Scurvy. E. S. Talbot. *Journal of Clinical Medicine*, 1921, xxviii, No. 2, p. 92.

In this instructive article the author shows that interstitial gingivitis, a disease of the alveolar process and a forerunner of pyorrhea alveolaris, is far more frequent and important than is ordinarily assumed. Only about ten per cent of patients have the advanced pyorrhea stage in which pus is present, whereas everybody sooner or later has interstitial gingivitis in some degree. Being a transitory structure, the alveolar process, after the second dentition, begins to undergo absorption, as the result of the slightest irritation, or in consequence of malnutrition and metabolic changes. The peculiar situation of the alveolar process as an end-organ makes it very susceptible and sensitive to irritations and nutritional influences. Because of the transitory nature of the alveolar process, most systemic changes are first observed in the gums and the alveolar process. The disease would probably be more correctly interpreted if it were called incipient scurvy. A lowered vitality and neglect assist in the production of this disease. What is considered scurvy in many patients is only interstitial gingivitis, or the milder forms of scurvy, in which other bodily symptoms are not present and in which only the gums and alveolar process are involved, owing to their transitory nature. The author's researches have shown that interstitial gingivitis is not an infectious disease. He has shown that the alveolar process is the first structure involved in malnutrition, faulty metabolism, and scurvy-producing interstitial gingivitis. Bone-absorption takes place first; afterwards, inflammation appears. This period is always recognized by bleeding of the gums. Finally, pyorrhea alveolaris may occur. Disorders of the alveolar process should be considered as one of the most important diagnostic signs of faulty metabolism, since the alveolar process has been shown to be the first involved in systemic disturbances due

to changes in climate, high altitudes, monotony of diet, and so on. The pathology of interstitial gingivitis, or pyorrhea alveolaris, and of scurvy, is identical, and a uniform term for the disease is therefore to be desired.

Mercurial Stomatitis. G. Maurel. *Gazette des hôpitaux civils et militaires*, 1920, No. 80, p. 1269.

One of the most frequent modes of onset of mercurial stomatitis is represented by mesial inferior gingivitis, the process beginning at the level of dental insertion, at the neck of the middle lower incisors, then of the lateral lower incisors. The vestibular portion of the gums is usually alone involved, the lingual portion as a rule remaining intact. The teeth at this level are as if encircled below by a purplish margin consisting of the reddened and swollen gums. Digital pressure on the gums, passing towards the neck of the teeth, causes a droplet of seropurulent pus to exude under the detached border of the gums. Sometimes, extremely obstinate, painful, irregular ulcerations with a yellowish floor, are met with. The patients complain of certain irritation of the teeth, painful mastication, a peculiar metallic taste in the mouth, and the breath has a characteristic faintly sour smell. There is a lateralized or hemistomatitis in which the mercury seems to exert its action only upon one side of the mouth, while the other side remains intact. This has been shown to be due to the patient's habitually lying on the right or left side; the stagnation of the buccal fluids at this point favors and localizes the inflammation, the affected cheek is reddened, sometimes excoriated and ulcerated, the redness being accompanied by a burning sensation and some salivation. The partial forms of stomatitis include a type in which the portion of the gums in contact posteriorly with the last large lower molar, usually the wisdom tooth, is detached; the tooth becomes gumless and behind it appears a small red tapering and movable strip of tissue, constituting retromolar detachment. This lesion may be bilateral, but is very often limited to the right or left side alone. Peripheral gingivitis, another type of partial stomatitis, consists of inflammation of the gums around a carious tooth, and old root, or a fragment of crown or an old stump. Here the mercury merely increases an inflammatory process of chronic gingivitis, which has locally produced a point of lessened resistance. All these forms if neglected may pass into generalized mercurial stomatitis.

Buccal Spirochetoses. Kritchewski and Seguin. *La Revue de Stomatologie*, 1920, xxii, No. 11, p. 613.

The various ulcerative and necrotic affections of the mouth constitute a group of diseases in the form of buccal spirochetoses; caused by different spirochetes, usually associated with each other, their pathogenic action being increased by the fusiform bacillus. A distinction is made by the authors between three forms: *Spirocheta tenuis*; *Spirocheta Acuta*; and *Spirocheta dentium*. Although morphologically distinct, these spirochetes in association with the fusiform bacillus produce identical lesions in guinea pigs. The fusiform bacillus by itself alone is not pathogenic, but is regularly met with in

the lesions and in the immediate vicinity of the necrotic zone where the spirochetes proliferate exclusively. After the spirochetes have disappeared under the action of the arsenobenzols, which constitute the elective treatment of these affections, the nonpathogenic fusiform bacillus is rapidly destroyed by phagocytosis, and the fusospirillary association at the base of the buccal flora is annihilated at the same time. All the buccal spirochetoses are amenable to neosalvarsan, either in intravenous injections or in local applications. In obstinate cases, the two treatments are advantageously combined.

From the prophylactic viewpoint, buccal hygiene is a necessity, for aside from patients evidently suffering from acute or chronic spirochetoses, there undoubtedly exist many germ-carriers who are all liable to develop ulcerative lesions of the mouth. In addition to the ordinary brushing and cleaning of the teeth, which is of primary importance, appropriate buccal hygiene should attack these local spirochetoses at their origin. By means of the incorporation of neosalvarsan in a toothpaste, the authors have obtained a stable compound of great efficiency against these buccal spirochetes. This mouth-infection is sure to be benefited to a remarkable degree as the result of treatment with the arsenobenzols.

Dental Clinic for South Australia. The Medical Journal of Australia, 1920, vii, p. 508.

The South Australian Branch of the British Science Guild sent a deputation to the Minister of Education, the Honorable G. Ritchie, on May 20th, 1920, for the purpose of urging him to provide funds for the establishment of a dental clinic for school children. The urgency of the matter was argued and the Minister promised that it should receive the earnest attention of the Cabinet.

Bucco-dental Sepsis and General Diseases. J. Tellier. Lyon Medical, 1920, lii, No. 19, p. 813.

The onset of a large number of infectious general disturbances has been referred to the existence of infectious foci around the roots of devitalized, dead teeth, and in a more general way, to all kinds of buccal sepsis. These cases are characterized by the presence of circumscribed tissue-areas infected by pathogenic microbes. Although opinions differ as to what degree oral pathologic conditions are responsible for systemic disease, it is a well established fact that infectious foci around diseased teeth may become the starting point of numerous diseases. The prophylactic role of the modern dentist must be the careful avoidance of pulpitis, the obviation of the necessity for devitalization. Destruction of the pulp is a misfortune, all devitalized teeth constituting a menace to the organism. All possible efforts must be made to prevent the appearance of the complications of penetrating dental caries. Before planning to utilize a devitalized tooth or root for a fixed prosthesis, it is necessary to keep in mind the effects of these complications upon the entire organism. Radiography is a very valuable diagnostic adjuvant, and

pictures should be prepared of all those maxillary regions which contain teeth actually or potentially the seat of infectious complications.

From the *therapeutic* viewpoint, it is noteworthy that the disappearance of the primary infectious foci does not always suffice to remove their secondary effects. While the infectious areas are being treated by the procedures or methods of odontologic technic, (treatment of root canals, apical resections, surgical procedures, extraction of diseased teeth or roots), the general treatment of the infectious conditions must not be omitted, an important part in this connection being played by preventive vaccinations and serum-injections. The discovery of the frequency of lesions known as alveolar abscesses and granulomata and their importance as a source of disturbances of the general health is of relatively recent date and has been brought out by means of dental radiography.

Influence of Bucco-dental Sepsis and Periapical Infectious Foci upon the General Health. J. Lagrange. *Revue de Stomatologie*, 1920, xxii, No. 6, p. 335.

A close relation undoubtedly exists between certain pathologic bucco-dental conditions and the rest of the body. The part played by infection of the organism, meaning microbic invasion (toxins and formed constituents) through the blood stream, is constantly gaining in importance. This chronic invasion naturally gives rise to a pathologic condition, preceded by a more or less evident disturbance of vital functions. This is the cause of the familiar lessened resistance, which is regarded as the basis of all definite microbic diseases, such as tuberculosis, or typhoid fever. This invasion of the organism by a microbic flora, the toxins of which may be extremely active, also accounts for the origin of so-called constitutional diseases, such as arthritis or gout, which according to personal observations of the author are apparently the scattered manifestations of one or more localized infections. Aside from the bucco-dental sepsis of neglected mouths, there exists a much more dangerous, because nearly always ignored, group of periapical infections, which may contaminate the blood stream during many years with injurious microorganisms. The significance of these periapical infections has been established only since the routine use of dental radiography. In either case, the path of election for the microbic invasion is not the digestive route, as is usually believed, but the circulatory route, especially as regards the periapical infections. The periapex of any tooth affected by pulpitis may be considered as infected. Absolute sterilization of teeth is practically impossible, all devitalized teeth sooner or later presenting microbic colonies at the apices. In the case of teeth with necrotic pulps, periapical infection is nearly always inevitable and constitutes the hidden foci where the blood acquires a constantly renewed supply of microorganisms and toxins. The duration of the latent period is extremely variable, almost indefinite in some cases, whereas, in others the course is rapid and complicated by neighborhood lesions, the formation of a fistula being the least among these local complications.

Association of Dental Caries with General Affections, Especially Gout and Rheumatism, as Tested by the Sulphocyanide Content of the Saliva. Levy (Berlin). *Zahnärztliche Rundschau*, March 29, xxx, 13.

The author's serial article, which closes in this number, terminates with the following conclusions: a marked degree of caries and rheumatism are almost without exception associated together, while between caries and gout there is no demonstrable connection. In pronounced caries the sulphocyanide content of the saliva is notably reduced, and this status is also found in rheumatism and chronic arthritis in general. In typical gout on the other hand the reaction for sulphocyanide is positive. This research of the saliva can give information concerning disturbed metabolism and can also assist in the differentiation of gout from other forms of chronic arthritis. To consider the rheumatism and caries association in more detail the author points out that in nearly 100 per cent of the rheumatic individuals examined caries was so marked as to interfere seriously with mastication. The diminished content of sulphocyanide is at present beyond explanation. In some of the chronic arthritides there is an infected condition of the organism which argues for metabolic disturbances, but on the other hand buccal infection may have originally been responsible for these arthritides. Finally in many cases there is no evidence of infection of any kind, and we are forced to assume the existence of some inborn constitutional inferiority. We can only state that defective sulphocyanide production indicates lowered resistance to disease.

A Microscopical Study of Pulps From Infected Teeth. Henrici and Hartzell (Minneapolis). *The Journal of Dental Research*, December, 1920, ii, 4.

The authors found active inflammation in fourteen pulps from forty-one infected teeth or 37 per cent—ample confirmation of the opinion previously arrived at from bacteriologic studies that the pulp may be invaded by microorganisms long before it is actually exposed to caries, and may be repeatedly injured long before it actually undergoes necrosis. The research was undertaken to test the validity of the opinion commonly held that an intact wall of dentin protects the pulp from infection, so that only caries or a trauma can make it possible for microorganisms to gain access to the pulp. Connected with this belief is the opinion that pain occurring previous to actual exposure of the pulp must be attributed to the presence either of temperature change or of lactic acid absorbed through the dentinal tubules, these two factors producing pain through the induced hyperemia. The authors have long held the opposed belief that microorganisms can invade the pulp in the absence of caries or before the latter has progressed. The invading organisms, however, do not, in the authors' opinion, set up suppurative or gangrenous processes but instead a granulomatous condition which ends in fibrosis. These alterations naturally pave the way for ordinary infectious processes. In the research to uphold or controvert this belief, the authors made studies of fifty vital teeth and the results which are stated in the opening paragraph of the abstract appear to bear out their views.

Diseased Pulp of Teeth in Relation to Sequelæ. C. J. Grieves (Baltimore).

The Journal of the National Dental Association, April, 1921, viii, 4.

The author comes to certain conclusions in reference to carious teeth with infected pulps. In chronic pulpitis, pulp degeneration and gangrene complete destruction of the subgingival odontoblasts and fibrillæ takes place so slowly that this layer of cells, vitally attached to the pulpal wall, often persists in any kind of pulp disease. It guards the apical third of the dentin, possibly transmitting sensation, for the latter often persists and indicates a vital apex. Pulpal infection is usually localized centrally and excepting the initial lesion—the carious exposure—it follows the large vessels and perivascular lymphatics centrally through the pulp, leaving tissues adjacent to dentin and cementum intact for some time. This pathway in fact is more accessible for the production of periapical disease than a general infection of the apex. The presence of nerves under such pulp conditions sufficiently intact to record pain denotes a persistent vascularity. The common resistance to arsenic, cocain and other medicaments offered by many stages of chronic ulcerating and granulating pulpitis is hopeful and indicates activity of Nature's usual granulation methods for protecting the apex and contained vessels against infection. The author mentions that over fifty per cent of teeth are free from periapical infection and seeks to determine how much of this large fraction is due to canal medication and pulp removal methods of the past, and to what extent this fraction can be increased in the future. He appears to believe that the use of germicides applied directly to the pulp has prevented many apex infections and that through the progress of modern technic the proportion thus saved is bound to increase.

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EDITORIALS

The Pre-Dental Year in Dental Education

FOR some time there has been considerable discussion over the advisability of adding one year of college work as a requirement to enter dental school. As a result of this agitation, a number of schools, some of their own volition and others because of changes in dental laws, will begin the course of 1921 with one year of college work as a requirement for admission to dental college. We believe this is a great mistake, because the four year dental course has not been worked out to the satisfaction of many. Until dental colleges have had time to fully test the value of the four year course, the addition of one year of college work as a requirement is also more or less of an experiment. In the first place, we fail to see how one year of college work is going to be of any benefit in the study of dentistry. A student who has graduated from High School, has a sufficient knowledge of all collateral subjects to enable him to study dentistry with a degree of intelligence. It is a recognized fact that the first year in

college is a year wasted by the majority of students. It takes one year before the average college student is able to find himself and to become accustomed to his surroundings so that he can do creditable work. Therefore it seems that this year of college work, which will be required by some schools for admission to dental college is a year of time absolutely lost.

Under the present conditions with the four year dental course, a student finds the time is long enough at best which is required to complete an education. The addition of the extra year simply means a loss of time to the student, an economical loss to the community, because this is one more year the student is not a producer. Therefore from an economic view point, the addition of one year of college work is wrong.

At the present time the number of men in the dental profession is not sufficient to take care of the needs of the public. With the addition of one year of college work, there will be a diminished number of men studying dentistry, with the result that there will not be enough men in a few years to take care of the public. As this fact becomes recognized there is a possibility that legislative bodies will so change the dental laws, as to allow anyone to practice dentistry regardless of the high requirements that have been set up by certain schools. This is more than possible as proved by the fact that one state has already so changed the medical laws that a graduate of any medical college, regardless of the standing that college has, will be permitted to practice. A few years ago because of the attitude which a certain state took in regard to educational matters, the State Board was revoked by the Legislative body and the dental profession of that state was thrown wide open.

It must be remembered that the great function of the dental profession is to serve the public, and whenever educational requirements are so raised by a number of enthusiasts, as to destroy the usefulness of the profession, the question of education will be taken out of the hands of a few and regulated by the masses which regulations will be detrimental to high ideals.

Another phase of the subject is the fact that the majority of men who are advocating one year of college work as a requirement for admission to dental schools, are men who are connected with Universities. This seems to be a move on the part of the so-called "University School" to establish such conditions as will render continuation of dental schools not affiliated with universities impossible. In fact under present conditions, very few universities, except those who have dental departments, are willing to give a student one year of college work, knowing that he will switch to dentistry at the end of that year. Therefore, certain dental colleges are being discriminated against by men who advocate one year of college work.

High requirements in dental schools are desirable up to a certain degree, but as soon as those requirements begin to react against the efficiency of dental education, then it is time to stop and consider the real motive. In considering this question, we believe that some of the men who advocate the extra college year are doing so because of selfish motives, believing that it will enable them to further control dental education, and they do not have the interest of the public or profession at heart.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The Alumni Association of the International School of Orthodontia, Inc.

Hotel Baltimore, Kansas City, Missouri,

July 14th and 15th, 1921

PROGRAM

Thursday, July 14, 1921

8:30 A.M.—Registration.

9:00 A.M.—President's Address, F. O. Gorman, D.D.S., San Antonio, Texas. "The Effect of Orthodontic Treatment Upon the Blood," W. E. Stofft, D.D.S., Omaha, Neb. "Possibilities of Prevention in Orthodontia," C. M. McCauley, A.B., D.D.S., Dallas, Texas.

1:30 P.M.—"The Relation of Malocclusion and Orthodontics to General Health," C. W. Bruner, D.D.S., Waterloo, Ia. "Radiodontic Examinations in Orthodontia," Clarence O. Simpson, M.D., D.D.S., Saint Louis, Mo. "Appliances," J. E. Taylor, D.D.S., Manhattan, Kans.

7:30 P.M.—"Vitamines," J. B. Wood, M.D., Kansas City, Mo. "Clinical Report on Experiments with Vitamines," Dr. Harry A. Allshouse, Jr., Kansas City, Mo. "Carborundum Treatment in Orthodontia," W. J. Brady, D.D.S., Kansas City, Mo.

Friday, July 15, 1921

9:00 A.M.—"Some Phases of Orthodontia" (with illustrations), L. R. Sattler, D. D. S., Omaha, Neb. "Some Principles Dealing with Cleft Palate and Harelip," Wm. Lete Shearer, B.S., M.D., D.D.S., Omaha, Neb. "Tic-douloureux," Harold P. Kuhn, A.B., M.D., F.A.C.S., Kansas City, Mo. "Malnutrition and Lack of Function as Important Causes of Malocclusion," S. E. Johnston, Ph.G. D.D.S., Kansas City, Mo.

CLINICS

- 1:30 P.M.—(1). "An All-closed Attachment for the Lingual Arch," W. A. McCarter, Topeka, Kans.
 (2) "Combination Lingual and Labial Arches, 21 and 22-gauge Tene Las," Hugh Grun Tanzey, D.D.S., Kansas City, Mo.
 (3) "Possibilities of Spring Attachments to Both Labial and Lingual Appliances," Milton Jones, D.D.S., Wichita, Kans.
 (4) "Appliances," (paper and clinic), J. E. Taylor, D.D.S., Manhattan, Kan.
 (5) "Clasp for Lingual Arch Attachment," Samuel E. Johnston, D.D.S., Kansas City, Mo.
 (6) "Retaining Appliances—Their Purposes and Possibilities," (paper and clinic), Homer A. Potter, Jr., D.D.S., Kansas City, Mo.
 (7) "Models and Appliances with Records Showing Results Obtained in the Treatment of Malocclusion," Harry A. Allshouse, Jr., D.D.S., Kansas City, Mo.
 (8) "Subject to be announced," T. W. Sorrels, D.D.S., Oklahoma City, Okla.
 (9) "The Oliver Model Trimmer," "Model Records," Bertha McNutt, Kansas City, Mo.
 (10) "Subject to be announced," Atler B. Conly, D.D.S., Dallas, Tex.
 (11) Some cases being treated at I. S. O. Clinic.
- 4:00 P.M.—"The Development of Structures of Face and Head," (Illustrated with crayon.) R. D. Irland, A.B., M.D., F.A.C.S., Kansas City, Mo.
- 7:00 P.M.—Alumni Banquet.

A Bust of Morton for the Hall of Fame—Send Your Contribution Now

In the election of Dr. Wm. T. G. Morton to the Hall of Fame the allied professions of medicine and dentistry have been singularly honored. By their overwhelming vote the electors have also evidenced the appreciation of the public at large for the beneficence of anesthesia.

Recently, at the Annual Dinner of the American Anesthetists in Boston during A. M. A. Week, Dr. S. Adolphus Knopf, the elector most responsible for the honoring of Morton, said it would be a proud privilege for the Associated Anesthetists to place a bronze bust of Morton in the niche assigned him by the electors. This is to be done in celebration of the Diamond Jubilee Anniversary of Morton's Demonstration of Ether Anesthesia.

The Associated Anesthetists, as well as other prominent leaders of the allied professions, are, therefore, urging all those interested to make substantial contribution for this purpose.

Send your check or money order at once to F. H. McMechan, M.D., Sec'y-Treas., Associated Anesthetists, Lake Shore Road, Avon Lake, Ohio.

Dental Corps to Have Orthodontists

War Department orders, recently issued, direct Majors B. C. Warfield, L. C. Fairbank and Neal A. Harper, Dental Corps, to report at New York City for temporary duty to take the postgraduate course of instruction at the Dewey School of Orthodontia, beginning June 20th, upon completion of which they will return to their proper stations.

Notes of Interest

Drs. Sattler and Stoft announce the removal of their offices to 900-904 First National Bank Building, Omaha. Practice limited to orthodontia and dental x-ray.

Drs. Robert R. Bosworth, Frederick F. Molt, Arthur E. Smith, and Howard C. Miller announce their association in the practice of oral surgery, extraction of teeth, and radiography, Marshall Field Annex, Chicago, Ill.

Dr. S. C. Wheat, Orthodontist, announces the removal of his office, 202 McMillen Building, to 417 Bonfils Building, 10th and Walnut Streets, Kansas City, Mo.

The International Journal of Orthodontia and Oral Surgery

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No. 8

ORIGINAL ARTICLES

PRESIDENT'S ADDRESS BEFORE THE ALUMNI SOCIETY OF THE DEWEY SCHOOL OF ORTHODONTIA, APRIL 25, 26, 1921, ATLANTIC CITY, N. J.

BY SYDNEY W. BRADLEY, M.D.S., OTTAWA, CANADA

TO begin an address with an apology is bad form I presume, but when this address was completed and I had reread it I realized that I had not expressed any new thoughts in it. But if the ideas are old but worth while I believe they will bear repetition, and the thoughts expressed in this essay are those of an orthodontist who has tried to, during the past six years, evolve with the evolution of orthodontics.

Our meetings heretofore have been gatherings marked by an enthusiasm and seriousness of purpose worthy of the problems which we had under consideration, and I know this meeting will be no exception. The desire of our alumni to keep abreast with the times as our science advances and that "esprit de corps" which prevails among its members argues well for this and future meetings. Our membership has increased so during the last few years that it is now most difficult to remember the names of all the newer members. I trust they will take a very active part in the discussions of the essays and feel at liberty and not too timid about asking questions. These meetings are particularly for novitiates in orthodontia. Perhaps the older, wiser men may smile at our ideas and questions, but there is one splendid way to get on the right track—find out what the wrong method produces. You will then accept the right principle with a feeling of pleasure and gratitude.

To our visitors I extend a warm welcome and trust mutual benefits may result from our fellowship during the meeting.

When you elected me your President at the Chicago meeting last year, I failed utterly to express my appreciation of the honor you had done me, but in my heart I was appreciative, not only because I prize the personal compliment paid me, but because by me it was regarded as a compliment you generous-hearted Americans wished to pay a citizen of your neighboring country to the

North. It was I believe an expression, if of only a very very small minority, of that good will which prevails in this glorious Republic towards Canada and Canadians.

I never feel a stranger in a strange country when I cross the border, because in the atmosphere of your country and of my own, everyone is born and bred under the common law of England and those principles of Justice and Liberty which the English-speaking race has believed in and carried with them wherever the English tongue is spoken. Differences of opinion on national questions are bound to arise from time to time between your country and mine, but they are differences which I believe can always be settled amicably in spite of the Jingoism we have in both countries. The fact that there is a boundary line of three thousand miles between us, without military or naval protection of any consequences, shows the world that mutual confidence exists, due I believe to the fact that the great majority in each of our nations are of Anglo-Saxon heritage.

The world eruption is over and it behooves all of us in our national and local, civic and social life to consider ourselves under a moral obligation to render the best service that in us lies to the betterment of our country and community.

Our specialty appears to be going through much the same throes of unsettlement at the present time that everything else of importance is going through. When orthodontists who have practiced from fifteen to twenty-five years or even longer, are still at variance over some of the primary principles of our science, what are we younger orthodontists to think or do? When men of reputation say that following the orthodox teaching of securing normal occlusion permanent results are not assured, it makes some of us think that perhaps our methods of procedure need treatment. When another eminent authority says the only proper way to secure permanent results in certain cases of disto- or mesioclusion due to heredity is by extraction, and we are taught, and I personally believe, it is wrong to extract except under most unusual circumstances, whom are the younger men to follow to secure the maximum of effective results? Personally the most disheartening, discouraging and puzzling cases that present for treatment are those where permanent teeth have been removed or where these teeth are missing. In cases like these you are not nearly so sure that your predetermined method of procedure and finished results will be satisfactory. We may say close up these spaces where it appears feasible to do so, but there are many cases particularly with the teeth of the mandible, where it is next to impossible to do so. These spaces will close themselves in time, but the tooth movement is not usually the way we would like it. Very often, I am thinking now of the loss or absence of the second mandibular premolars, the anterior teeth will drift distally whereas you wish to move the molars mesially. In a few of such cases I have now in mind I found this a most difficult thing to accomplish; I find it difficult to carry the molars mesially in an upright position while it appears to be quite easy for the anterior teeth to move bodily distally, leaving a space between the upper and lower incisors. It is easy enough to tip the lower molars and draw them mesially that way but we do not wish to do that.

In our specialty we need broad-minded men who will not follow any one-man methods, but select the best thoughts and designs from all and apply them in the treatment of their individual cases. There is no specific method to treat each of the cases that may come under our observation, only general principles apply. We should use the eclectic method which means following the best general principles but using individual initiative in the details of treatment. I believe that there is a place for all the different appliances with but few exceptions, and if we can select the best method and appliance to treat the case in hand we are well on the way to a successful termination. But let us remember the best possible appliances for a particular case will not correct that case, it is the mind and the hand guiding it that achieves the results. In our zeal to select the best appliances we must not overlook the underlying causes of the malocclusion. There is the great danger of drifting too much into the realms of appliance making and forgetting the study of etiology and nutrition. The man with an extensive orthodontic practice has not the time to study etiology except by personal observation of his patients. This after all, is really the best way to study it. It is not abstract knowledge. If we are going to make real advances in our work it will be principally along prophylactic lines, by paying more attention to the nutrition of our patients and to the environment of the teeth; a well balanced diet, suitable to the age of the child, clean teeth and healthy contiguous parts, gums, throat and nasal passages, and no bad habits.

I realize more and more the hopelessness of correcting malposed teeth and not removing the contributory causes, some of which are oftentimes most obscure. Impaired breathing not corrected, means failure in the vast majority of cases. If parents refuse to have the child's throat cleaned up it is not advisable to begin orthodontic treatment. Take also the anemic undersized and apparently underfed children which sometimes present for treatment; very often too from the wealthy and better class of people. The alveolar structure of these children does not respond to mechanical stimulus as does that of a healthy child. It is most difficult to create cell activity and the process of moving teeth for these patients resembles more the movement of teeth in the tissues of persons who are past the growing period. Retention of these cases is prolonged, and you are not sure of permanent results unless during the period of treatment or of retention the child's health and growth be brought to normal. Undesirable habits must be discontinued to have satisfactory and permanent results. If a child persists in thumb or tongue sucking, lip biting, or any habit which was a factor in causing the malocclusion and does not give it up for good, permanent results are impossible. Lack of cooperation of patient or patient's parents during the treatment period also spells failure. Parents sometimes lose interest and fail to see that the orthodontist's instructions are carried out in the home treatment. If such a condition be not remedied you might just as well remove the appliances and stop treatment, for you are wasting your own time and the parents' money and accomplishing little or no good.

I would like to touch briefly on the subject of cooperation between the dentist and orthodontist. We cannot deny that our work is most intimately

connected with that of the family dentist, and when we are asked to consult with the dentist concerning a case of malocclusion let us gladly give our advice frankly and freely. Very often it will be free, very free, but that should not deter us in carefully looking over the case and advising the patient or parents the best method of procedure. Let us above all things not assume that "holier than thou" attitude towards general practitioners and feel above communicating with them. Let us be absolutely honest with them in our advice, being particular to emphasize that there is no royal road to successful results in orthodontia, that there are no secrets that we wish to hide; that we are willing to assist them in any way we can. At the same time I do not think it is advisable to undertake cases for out-of-town patients in conjunction with their family dentists. The dentist's ideals and yours may be different and certainly his ideas on orthodontia are different, and such cases are generally unsatisfactory to all. If the case under consideration be such that you think he can carry it to a successful termination with "store" appliances, advise him what to get and do and help him all you can, but keep your hands off if you wish to avoid trouble. Preach against and kill that idea which should have died long ago that "Leave the case for a while and perhaps the teeth may correct themselves." Ask the dentists to send their cases early, that you may assume the responsibility of commencing the correction at the proper time. Let the Golden Rule be the guide in our relations with the general practitioner. If we do, those relations will be most happy and results best for all concerned.

Returning to appliances, I wish to make some remarks which I believe will benefit the younger members particularly. Precious metal appliances are much to be preferred to those of base metal. Neater appliances can be made and accurate control of the temper of the material obtained. Technic will improve with the use of precious metals. Do not go half way in this; either use one or the other. To combine them means trouble and annoyance. Caries may develop more rapidly under precious metal appliances, but I am not so sure of this. It is impossible to keep some teeth from decaying, no matter what is used, due to lack of cooperation of the patient and parent. I found that all the base metals corroded more or less in some mouths and in the long run were more difficult to manage and more unsatisfactory than gold-platinum. I also believe that to ensure stable results in many cases we must resort more and more to bodily movement of the teeth, putting both crown and root end exactly where you want it, not depending altogether on occlusion to accomplish this. To do this most effectively I have found no better appliance than the pin-and-tube, using half-round pins as described by Dr. George Grieve in his paper at our meeting last year.

Before closing this chaotic and perhaps pessimistic address let me say that all the improved appliances and all the new "stunts" brought out from time to time and shown at our meetings will help us greatly, but will not counterbalance careful, painstaking and conscientious efforts. Orthodontia is not an easy specialty. It is not the specialty for a man who is always in

a hurry. It requires study, study, study and high technical skill to be even fairly successful.

Let us all be as good orthodontists as possible. By so doing we shall not only be personally benefited professionally and financially, but we shall elevate the status of orthodontia in the eyes of the general practitioner and also in the estimation of the laity. Let the Alumni of our school in particular be among the best and most successful practitioners. By being successful, I do not mean success in the accumulation of wealth, or success in reaching the heights of eminence, but in producing more efficient masticatory organs, more beautiful faces and healthier bodies for those patients who come under our care, enabling them to be better and more useful citizens. We owe it to our school, our teachers and our science. Every careless, lazy alumnus who is not interested in his work discredits our school, our teachers and our specialty. Every alumnus who is a good orthodontist honors our school, our teachers and our science.

Let me close by expressing my thanks to the members of the various committees whose work has made this meeting possible, particularly I would mention Drs. Oliver, Fisher, Dewey and our splendid and enthusiastic secretary Dr. Burke.

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THE RELATION OF THE PHYSICIAN TO THE ORTHODONTIST*

BY DR. J. B. BILDERBACK, PORTLAND, ORE.

UNFORTUNATELY in the past there has been but little team work between the dentist and the physician. If you will look up the literature you will note the lack of cooperation.

In 1913 the Pediatric Societies of New York and Philadelphia invited a number of eminent dentists to one of their meetings. Several wonderfully instructive papers were read by the dentists and discussed by the pediatricians. However, the hopes built up at that time for closer cooperation have fallen short of realization.

There are three men that should work in close cooperation. They are the orthodontist, the rhinologist and the pediatrician.

When the orthodontist sees the child, for the first time, the hour has passed when he can do anything but attempt to remedy a malocclusion. While you must go on with the work of correction as long as you live, yet at the same time we must seek to develop greater interest and effort among pediatricians and orthodontists in the work of prophylaxis.

To the pediatrician, more than anyone else, falls the responsibility of endeavoring to give the child a good set of teeth. Our contract with the child starts very frequently at an early age, often at birth, and it is absolutely under our care for the first few years of life. Every effort should be made for maternal nursing, because while our knowledge regarding artificial food has advanced, nothing can take the place of breast feeding. Nature has intended every species to nurse its offspring. If this is supplemented at the proper time by accessory foods that require mastication then the proper start has been made toward a good set of teeth and normal jaws.

If it is possible, we should go a step farther, back to the mother; in fact we would like to go back two or three steps to the grandparents, but as that is impossible we should enlist the interest and cooperation of the obstetrician, so the mother during pregnancy will be properly fed.

There are so many angles to medicine that it is difficult to avoid conflict at times between different specialists.

For instance, while the orthodontist is looking forward to the teeth of the child, the obstetrician is rightly thinking of the welfare of the mother. Consequently, in order to avoid complications at pregnancy, particularly in women who have a contracted pelvis, the obstetrician curtails the diet of the mother in order that the child may be small. It frequently happens that it is

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born underweight and poorly nourished, having been deprived of nutrition during a very critical time in the formation of the skeleton and teeth.

With increased cultural refinements there is a lack of mineral salts in the nutrition. In the preparation of foods, particularly vegetables, the necessary salts are extracted by boiling, and thrown away, also children are given too finely refined flour in their bread.

We are living in a soft age, and this is particularly shown in the foods given children of the better classes during the last twenty years.

It has generally been taught, particularly in books on infant feeding for lay circulation, that a child's diet should consist of milk, mush and broth up to the 12th and 15th month, foods, as can readily be seen, are swallowed but require no mastication.

We now believe that this has been a mistake, that babies not later than five months should be given bones, hard crusts to bite on so as to help develop a good biting jaw and the bones of the face; that they should be encouraged to chew their food in the early months so as to develop the habit, because if a child has been kept on soft foods, and sucks its milk from a nipple until it is a year old, great difficulty will be experienced in getting the child to masticate.

Frequently children are brought to us that have been kept 18 months to two years on a bottle. They are living almost entirely on milk. They are markedly anemic and they will absolutely refuse to take solid food, unless the milk is taken from them and they are starved to it. Sometimes it may take several days, often a week, before a child will allow solid food to be placed in its mouth. These children are professional bottle drinkers and whether from the long use of the nipple or lack of mastication they nearly all have malocclusion and need the services of an orthodontist.

On account of our intimate contact with the child, physicians should watch for early decay of the deciduous teeth and work in close cooperation with the dentist to save them, to prevent malocclusion, and to keep the child's nutrition up, because when a child has lost several teeth and also has a number of carious teeth, he is generally below par physically and the orthodontist cannot get the best results unless the patient is physically fit.

Man has gradually come to rely upon the brain instead of the muscle in advancing himself. He has thus, through less use, allowed many of the formerly important organs to assume a less valuable rôle in the human economy.

This is true of the teeth, and consequently we find a greater degree of susceptibility existing than formerly.

Man, too, has less need for his olfactory and auditory senses, he being no longer dependent for existence upon the search of game in the open. This has brought about a greater degree of degeneration, especially in the size and freedom from obstruction of the nasal tract. Consequently upon this results a greater degree of deformity of the maxillary arch and a more pressing need for correction of these conditions. One very important consideration in the prevention of deformity is the preservation of the deciduous teeth.

There is probably no one condition, but several factors acting as a vicious circle that produce malocclusion. Does mouth breathing produce a high dental

arch or does a high arch produce conditions that make mouth breathing necessary?

It is a fact that uncivilized races have a far better developed dental arch and less malpositioned teeth than the civilized races. It is also well known that their foods are more in the natural state requiring much more mastication, than the foods of the civilized races. We all know that our foods are so well prepared as to require little or no exercise of the teeth to prepare them for swallowing and that it is very hard to masticate food where mastication is not required.

In a most excellent article, McClanahan of Omaha, emphasizes the fact that, "the removal of the adenoids will not cure the mouth breathing unless there is a normal coaptation of the teeth which implies there is a normal development of the maxillary arch.

Then the nasal fossæ are normal in size in so far as bony structure is concerned, with room for the free flow of air into the vault of the pharynx unless some growth or inflammatory condition be present.

In many cases of adenoids that have been unsuccessfully operated upon for the relief of mouth breathing, it has been found that there is bad coaptation of the teeth as well as a distinct evidence of the maldevelopment of the superior maxilla and the other bones in intimate relation to it, namely the vomer, palate and turbinate bones.

The usual type of malformation is a deep hard palate, either circular or angular, a retraction of the mandible, due to its being drawn downward and backward and consequent apparent lengthening and actual narrowing of the superior maxillæ, the upper lip appears short and can be brought in coaptation with the lower lip only by strong muscular effort.

This is the typical adenoid face but the appearance is due to the defective development of the upper jaw. When there is an obstruction in the nasal fossæ the result of the high arched palate, narrowing its lumen, or a deflection of the nasal septum, or thickening of the turbinates or growth, one and all of these conditions lessen the capacity of the nose as a breathing organ.

In these cases but slight relief will follow the removal of the adenoids because the obstruction is in front of the vault of the pharynx.

It is unfortunate that we did not have expert rhinologists and orthodontists during the middle ages. The adenoid face has existed for many centuries as is shown in many oil paintings of the 15th century, particularly those of the Royal family of Spain, notably Philip the Second. Who knows but what this monarch's mouth breathing and malocclusion were responsible for his being an incorrigible, and for his cruelty and persecution of the inhabitants of the Netherlands. The map of the world might have been changed if Philip as a boy had had his adenoids scraped out and his teeth straightened.

In conclusion, we should encourage breast feeding, insist on the child having food that requires mastication early in its life. If it has nasal obstructions, due to adenoids, have them removed at once, even though the child is only a few months of age and lastly, if the child shows a tendency to maloc-

clusion get him in the hands of the orthodontist as soon as the condition is recognized.

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DISCUSSION

Dr. Wm. Cavanagh, Portland, Oregon.—I should like very much to have had Dr. Bilderback's paper two or three days ago in order that I might discuss it with a reasonable amount of intelligence, but since I have heard him before, I felt I pretty nearly knew the line of thought he would have to take. That is in no sense meant as a reflection on the Doctor. He has presented the very things we are glad to listen to, inasmuch as he hits the nail right on the head. We know we are at a disadvantage in not getting in contact with the patient at the proper age. We do not see the patient soon enough to give the advice the pediatrician is enabled to give. Men in his specialty are called on early to treat the babies, and probably the mothers prior to the birth of the child. Much of our difficulty is due to what occurs before the child is born. It seems to me that we as orthodontists are fighting the natural processes of evolution. We realize there was a time in man's existence when the skull was very much underdeveloped. Prehistoric man is noted for his lack of development in the fore part of the head, and also for the overdevelopment of the jaws, indicating his life was practically physical, and the mental was not developed. We are now passing through that stage of evolution where the brain is being overdeveloped possibly, and the physical, through the fine preparation of our food is underdeveloped. So we are fighting the natural processes of evolution, and I doubt very much whether we can stay the tide. We are able to benefit the individual, but I question whether that benefit which we are able to render that one individual will be carried along into the next generation. There was a time when all abnormal positions of teeth were attributed to inheritance. Then the pendulum swung the other way, and it was attributed to the lack of solid food, mouth breathing, and everything but inheritance; but I still see enough of the parents with the children to note a strong similarity in type. Now if we doubt the influence of inheritance we will go back to the problem of missing teeth. We are familiar with the parents, grandparents, and children who have certain teeth missing, generation after generation. I think this is a positive evidence that certain defects in the dental apparatus are handed down from one generation to the other. I am thinking now of the case of a mother with two teeth missing—they never erupted. Her eldest son had sixteen teeth missing. Rays showed no germs there at all. What will be the condition in the next generation if the same ratio applies? Then, in other cases, it is the same tooth that is missing. For instance, the lateral incisor which is absent in grandparents, parents and child; so we are up against inheritance which is one of the steps in evolution, I think. We are convinced, especially those of us who listened to Dr. Hine the other night, that exercise or vibration is necessary to the proper development and preservation of the tooth, and to the development of the jaws. A child brought up entirely on milk and soft foods may get the elements necessary to the upbuilding of the body generally, but he is not getting that vibration of which Dr. Hine speaks, and which we are all convinced is a necessary thing. Exercise is also essential to preserve teeth from decay and to stimulate the bony development essential to normal occlusion. But children who have passed the age when the deciduous molars have erupted without learning to use those molars are always averse to the formation of habits which involve the vigorous use of these teeth. As a result, where improper methods of feeding are followed out for two or three years beyond the time when solid food should have been given the patient, the habit of just rolling the food over and swallowing it is formed. That is one of the hardest possible habits to break up. It is a difficult thing to encourage the child to masticate his food after forming this careless

habit. As a result of this careless method of chewing these children lack the interdental spaces. These spaces, as we know, must form between the first and second incisors and deciduous canines at or before the fourth to fifth year of age; otherwise the teeth must be crowded into abnormal occlusion. Therefore, exercise next to nutrition is one of the most essential factors in the development of the child. If a child's arms are tied up until five to seven years of age, how well developed will they be? Yet they do practically that same thing when they do nothing but swallow in order to exist. There is another point where the rhinologist is involved. There has always been the argument as to whether mouth breathing precedes narrow, undeveloped maxillary arches, or the reverse, where the narrow mouth and narrow nose is a sequence of the mouth breathing. The mouth breathing seems to have no effect on the lower jaw, except in point of position. The mandible is developed pretty largely through the position of the tongue. Why is it that the upper jaw is the one most largely affected in its shape and development through mouth breathing? Why does it not affect the lower jaw other than in the matter of position? I am speaking of the width of the two arches. The width of the mandibular is rarely affected by mouth breathing. The maxillary arch may be so narrow that the buccal cusps of the premolars and molars occlude within the cusp of the mandibular. Frequently, we find the mandibular arch practically normal with the maxillary as much as three quarters of an inch too narrow. The position of the mandibular is affected, but not its size. I am a confirmed believer in the cooperation of the three branches of practice, that is, orthodontia, rhinology, and dentistry. Much of the malocclusion comes through the neglect of the deciduous teeth. The carelessness in the treatment of the deciduous teeth is responsible for a large percentage of malocclusion of the permanent dentition, and if the pediatrician will bear that in mind, seeing the patient as early as he does, with the four specialties, orthodontia, pediatrics, the nose and throat specialty, and the dentist, all working together we could produce a much better apparatus than most children now have.

Dr. Power, Seattle, Wash.—I would like to ask a question. I do not understand exactly whether the Doctor implied that when the physician in charge of the woman during pregnancy advised a restricted diet in order that the child should not be of too great size or weight for its easy delivery, that the dieting might also be to the extent that it might possibly injure the child in its development. I can see very readily how that could occur, and I ask it as a point of information.

Dr. Scott, San Francisco.—A great deal may be said on this subject. I think the whole thing reverts to heredity and environment. There is a great tendency on the part of the human race and the animal kingdom to eliminate anything that is not used. We probably have examples of that in the third molars, second incisors and often in the premolars. The premolars are absent in many cases. We have heard that the fish in Mammoth Cave have no eyes, because they have no use for eyes. The American Indians in all probability had about as nearly normal occlusion of the teeth as any race of people, so far as we know. Their food consisted largely of common Indian corn, acorns, hazelnuts, and food that required a great deal of mastication. They developed good jaws, although they lacked in brain development. Between 95 and 100 per cent of children below the age of three have normal occlusion. It may be in detailed examination these children did not have their occlusion entirely normal. However, between the ages of three and nine about 95 per cent of them had abnormal occlusion. What is the reason for that? The fact is we cannot advance an entirely satisfactory answer, but it is probably due to the fact that the child up to the age of three takes its food the same as children did one hundred thousand years ago. But our food between the age of three and nine is changed. It is of a different physical character. We blame a great deal on heredity that really does not belong there. The country physician has a large advantage over the city physician as he has seen the children grow up, the fathers, the grandfathers, and maybe the great grandfathers. He may say, "Here is John Smith's tuberculosis coming out through his grandson," for instance. There may be six children in a family, and each one is allowed to suck the thumb and each one is given wrong food, and each in all probability will develop dental trouble. If each one is allowed to do the same thing each will develop the same trouble. So, you see, this is not heredity, but it is the influence of environment on the organism.

Dr. Rogers closed up one side of a puppy's nose, and found that the side that was not closed will develop. The other side does not develop. This is not heredity, it is environment. Because a man has one leg cut off, it does not mean his children will have but one leg. They have been cutting rat's tails off for ages. Every rat has a tail just the same. However, in the case of the dental apparatus, where the teeth are not used they will be eliminated, because of their nonuse, and I think the same thing applies to any other organism. The idea has been advanced that if we keep on riding in automobiles we will not have feet.

Dr. P. T. Meamey, Portland, Oregon.—In regard to the bread that the children are eating today, I think it is a big field for some advancement. I would like to hear Dr. Bilderback's opinion in regard to the home-made products compared with the baker's bread that is being so widely used. It is easier to get the latter, of course, and there is less work involved. The children are eating a great deal of food of this class, devoid of the principle required for bone building.

Dr. Dinham, Portland, Oregon.—Our work should not be limited entirely to correction, but the subject of prevention should have its place in our work. There is the possibility, and indeed the absolute necessity for co-operation between the physician and orthodontist, so far as the food question is concerned. The development of the jaws necessarily depends upon the calcification and proper use of the teeth. But the orthodontist does not get the opportunity of advising the parent as to proper food to give to the child. That is where we note the importance of the better relationship between the physician and the orthodontist. We get the case at a time when correction is necessary.

We do not have the opportunity of seeing the patient during the period when prevention would be relatively easy. So the importance of the relationship between the two professions is of the utmost importance.

Dr. Morehouse.—There are two points which I think the orthodontist and the child specialist should bear in mind distinctly. First, that the physician who has in charge the care of the mother during pregnancy has to my mind been at fault to a large extent in the majority of cases of maldevelopment. The lack of a proper consistency of the tooth structures invites decay at an early age. I think the medical profession would do well, and would assist us more than any of us can realize if they would pay a little more attention to the care of the mother with a view to the welfare of the child. The mother's life in many instances is dependent of course on the other angle of the question, but I do not believe the former point is kept well enough in mind. There is another point on which possibly I am a crank. That is the fact that the muscles of the jaws never are made to perform the functions they were intended for. I try to impress my patients and parents that the bones of the jaws depend for their development just as much on the muscles attached to them, as do the chest and arms and limbs on the muscles that operate them. Orthodontists will remember the experiments of Dr. Hellman relative to breast-fed children and bottle-fed children. I have forgotten the difference in pounds between the bottle-fed and breast-fed children, but with the bottle-fed child the sucking pressure was practically nil, no pounds pressure being exerted, but with the breast-fed child, a great deal of pressure was exerted.

Dr. Bilderback, closing discussion of his paper.—The children's doctor sees the child as a whole, it was not my object to encroach upon Dr. Kistner's paper, but we get these children before the rhinologist sees them. They bring the child in because he is a mouth breather, and we recommend the removal of the adenoids. Many cases are as bad after the operation as before.

In regard to the diet of the mother. Sometimes, as you may know, the obstetrician has to think of the mother, and the diet may be curtailed a great deal. It stands to reason that if the mother is on a limited diet her nutrition may suffer badly and the developing child starting with the microscopic cell is deprived of sufficient nutrition over the period of eight or nine months, during which time the skeleton and teeth are being formed.

Relative to breadstuffs, they have become too refined. We like the nice white bread with the tender steak. Children do not like to eat whole wheat bread, but they should.

If the figures found in the dispensary in Boston that children up to three years have teeth fairly well approximated, then what happens after the third year? If it is true that 85 per cent are right up to the third year, and then the percentage is reversed up to the ninth year, what is the cause? I think chewing and mastication are very important. Could it be possible that the reason the percentage changes is due to the fact that children do not masticate, do not chew enough to develop the bones and muscles of the face? I do not suppose it is due wholly to congenital conditions. It may have something to do with it, however. We are doing all we possibly can to have the mother nurse her babies. Why does not the average modern mother nurse her baby? In primitive countries mothers all nurse their babies. Civilization is making the change. It is due to nervous influences. Dr. Sedgwick of Minneapolis found the mothers of American cities were not nursing their babies. He sent a questionnaire to Doctors' wives and they sent back answers: two months, three months or four months. He had special trained nurses sent to these mothers, showing them how to express the milk, etc. In a little while the breast secreted more milk, the secret of good milking of course, is to thoroughly express the milk from the breast. Now every mother in Minneapolis receives a card, and it is followed up by someone coming and teaching her how to nurse the baby successfully. Consequently, the mothers of Minneapolis are nursing their babies longer than in any other city in the United States.

Do you know that we have a tremendous mortality of infants under one year of age. Three hundred thousand die annually in the United States, two hundred and seventy thousand of them are bottle-fed. While we have learned something of artificial feeding of infants it is not what nature intended. When a mother does not have enough milk we frequently supplement with the bottle. We have to. In a little while the child learns to wean himself. It is so much easier to take it out of the nipple than out of the breast. The child will refuse the breast and depend upon the bottle if care is not taken.

My speaking about breast feeding may not seem pertinent to the subject, but we feel if the child has what nature intended it to have, breast milk, which is supplemented later with foods that require mastication, there is less likelihood of malocclusion occurring.

SUGGESTIONS IN REGARD TO THE USE OF LINGUAL ARCH

BY E. C. READ, LONG BEACH, CALIF.

BECAUSE of the inspiration and help received at the meeting of this Society one year ago when Dr. Mershon was with us and gave us the benefit of his wide experience in the use of the lingual arch I went home determined to try it out more fully, and if possible to master its technic.

While many difficulties have been experienced, the results obtained with its use have been very pleasing and I feel that we have as yet failed to appreciate its wonderful possibilities.

It is more cleanly, not so unsightly, and does not interfere so much with the normal muscular action. It is especially indicated in young children where we have a great many of the temporary teeth present. The slow, gentle pressure of the arch when properly used brings about normal development and one can get the desired change with very little soreness. This is due to the fact that the pressure is constant and that it is not necessary to adjust so frequently.

It may be used advantageously in a majority of cases. The labial alignment wire seems to be a necessity in Class II (Distocclusion) cases but even in some of these the lingual wire may be used in connection with the labial.

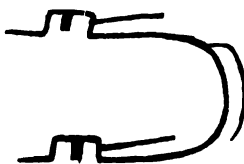


Fig. 1.

One of the most frequent difficulties is the breaking of the wire near the attachment. This is due to the bending of the wire at this point when it moves up and down in the anterior part of the mouth. This can be overcome by the use of bands with a hook to support the wire. These bands may be put on the first premolars or one of the incisors. Very little difficulty is found in this regard on the mandibular arch, but many patients have a habit of playing with the wire, with the tongue, on the maxillary teeth.

One should be very careful and not produce too much pressure and also in adjusting to keep the proper alignment of the posts to the tubes, otherwise it is very trying on the anchor teeth.

To secure proper alignment one should place the pin in position in the tube on the left side and note the relation of the pin to the tube on the right

*Read before the Pacific Coast Society of Orthodontists, Portland, Ore., Feb. 16, 17, and 18, 1921.

side then remove and adjust until the relation seems correct. Then place in position on right side and note relation on left side and adjust until found correct. It is always necessary whenever making any change in the form of the wire to be careful and see that the alignment is correct as there seems to be a tendency to rotate the mesial angles of the anchor molar teeth lingually.

By seeing that the wire is in contact with the premolars and by extending it distally you can secure additional support from the second molar when that tooth is in position.

It is also frequently advisable to solder a short piece of wire about 21-gauge so that it fits snugly against the mesial surface of the first premolar. This will help to prevent displacing molars distally and will give the space gained by the development in the canine and incisor region where we most generally need it.

Very frequently on the mandibular I drop the wire at the bend just mesial

Fig. 2.

to the attachment far apically and use this wire as a base wire to which I solder auxiliary wires of about 20 to 21-gauge, according to length. On each side at the bend just mesial to the attachment, wires are soldered extending along the gingival border of premolars as far as the canines. Also additional wires, such as the case may indicate, are soldered to the base wire and bent so as to engage the anterior teeth. (Fig. 1.)

These wires, with free ends, are very readily adjusted and they may be allowed to remain for weeks without readjusting. This same type of appliance may be used on maxillary teeth as well as mandibular only, of course, carrying maxillary base wire gingival on palate.

I have just placed in position within the last few weeks in three different cases, another form of this gingival arch with which I believe we have more freedom of adjustment and can overcome the tendency to rotate the molar anchor teeth. I will describe it to you and shall be pleased if any see fit to try it out.

In making this appliance, solder the half-round pins to wire about one

inch from end; then bend gingivally, then mesially and carry along gingival margin of premolars to about the canine region and leave this a free end. Distally to the pin, bend the wire up a little above the gingival of second molar and cut wire. Do this for both sides and place in position in tubes on plaster model. Bend base wire to form. This should pass around arch about $\frac{1}{16}$ " above the gingival line and close up against the palate. Cut to desired length and place in position on model and solder to distal ends of wire in tubes. Band first bicuspids and support auxiliary wires with hook. Other auxiliary wires may be used on anterior teeth as the case may indicate. These auxiliary wires very frequently may be used as small as 24-gauge (0.020).

The accompanying cuts with appliances in place on models will give you a clearer idea of the construction. (Figs. 2 and 3.)

FIG. 3

Fig. 2 shows an 0.020 auxiliary wire in position to move laterals. The laterals should be banded with spurs to hold wire in place at gingiva.

Fig. 3 shows the premolars banded to aid in holding appliance in place. The spur on the premolar band extends mesially and a short light wire soldered to the arch wire passes above this spur and against the mesial surface of the premolar. This holds the anterior part of the appliance in place and also gives additional support to the anchor teeth when any stress is applied that might tend to displace them distally. All that is necessary in placing into position or in removing is to spring arms lingually just enough to pass spurs.

The appliance is made of 19-gauge (0.036) spring wire. It is not necessary that the arms extending along the premolars should be as heavy as this. In fact they had better be as light as 21-gauge.

DISCUSSION

Dr. Power of Seattle, Washington.—Mr. President. The Doctor sent me this paper some time ago, and I have fully intended writing a discussion, but I have been so busy with

dental legislative matters up in our State, that I have not found time to do so. I visited Dr. Morehouse in Spokane some time ago, and certainly the majority of the work on the lingual arch that I know I received at his hands. Although, I also wish to acknowledge Dr. Baldwin's and Dr. Barker's assistance while there. Dr. Morehouse gave me the use of the coin gold seamless bands in different sizes, and I have been using them, and he showed me how to solder on the half-round tube and how to use the half-round wire. I realize that the lingual arch has wonderful possibilities. I wonder what the Orthodontia meetings of a few years hence will be like? In my own short career I have seen men right about face on orthodontia problems. How a man can stand up and declare by all that is holy that such and such is positively so, and then a few years later on stands up and does not even refer to the former method he advocated, but ignores it absolutely and recommends something totally different, is quite beyond me. I think the new methods are steps in the right direction. I am here to learn. I am working this matter out and am using the appliances, and am meeting with success, and hope to be further along when I return home from this meeting. I thank you very much.

Dr. Mann.—I wish to compliment Dr. Read on his paper. I feel he has suggested two or three points of value to me in the treatment of some of my cases. I think he has improved the lingual arch in many ways.

Dr. Scott.—I have enjoyed Dr. Read's paper. I will say for Dr. Power's benefit that we had six dozen tubes on a piece of shaft 14 inches long, and the fit was very inaccurate.

Dr. Cavanagh.—I want to thank the essayist for getting me away from the Simon-pure concealed appliance. I am glad to see somebody has conceded we may use a band in plain sight in conjunction with the lingual appliance. It will save me considerable trouble. I want to use a band or two occasionally.

Dr. Baldwin, of Spokane, Wash.—It is evident that the object of putting a band on a tooth with spur to engage the finger spring is for the purpose of controlling the force so that the spring or arch will not become displaced. But the lingual arch will work without visible or appreciable force, and needs no accessory devices to overcome displacement caused by excessive pressure. It is possible to make and use the lingual arch and finger springs without resorting to the tying down of the appliance to obtain necessary results. You will accomplish just as much with a more extended treatment and have less trouble in the retention than if you apply the maximum force and have to wait for nature to catch up with the tooth movement that you have accomplished in a short space of time. I will demonstrate at the clinic a very simple means of ligating the arches. There is a way to tie a fine wire around a tooth which will absolutely hold an arch as securely as when forced under a spur on a band. You get with this ligature the same result without the tendency to displace a banded tooth. A displacement will occur sooner or later if you crowd a spring or arch under a spur on a banded tooth.

Dr. Mann.—I want to emphasize slow treatment, lots of time and little force. My best results are the cases where there has been no hurry in the treatment. My shortest retention is the result of a very slight amount of adjustment.

Dr. Morehouse.—I would emphasize the fact that too many of us are prone to try to work this lingual arch too fast. When we started into orthodontia from dentistry, we were too much in a hurry with all of our cases. With the ribbon arch we were too much in a hurry, and we are still too much in a hurry. Dr. Mershon emphasized his belief that orthodontists are poor "waiters." So far as the banding of the teeth is concerned, Dr. Mershon brought out the fact that he found at certain times and in some places it was advantageous to put on bands to help hold the finger springs. I have followed Dr. Baldwin's suggestion as to ligating the arch instead of using bands, and I have found it more satisfactory, though I feel we cannot emphasize too often or too strongly the point on which Dr. Mershon laid so much stress, namely the slow work with the lingual arch, and on the necessity at times of holding these finger springs in position.

Dr. Read, closing discussion on his paper. I thank the members for their very kind

treatment in discussing my paper. Let me emphasize the desirability of using the lingual wire in treating young children. I have a great many patients, five, six, and seven years of age, and because of the constancy of the force of the lingual arch you get normal development much better than you can from a labial arch, which is somewhat intermittent in its action. I think the lingual arch works more in accordance with nature. It is difficult to place bands and tie ligatures about the labial arch on those short, deciduous teeth. It is an easy matter for the ligatures to slip gingivally on the deciduous teeth. The little children are the easiest patients I have to work for and these lingual wires remain in place much better in the case of the very young patient than in those twelve to fourteen years of age. I have a number of patients from a distance that I see not more than once each month. In one case the deciduous teeth are very short, the child is only seven years of age. The appliances on the upper and lower wire attached to the second deciduous molar teeth, the right mandibular lateral was uninterrupted, and the central was practically against the canine, and by placing the mandibular arch into position with the finger spring from the region of the molar, reaching underneath the arch, the incisor was carried to the left. It did not require much pressure, or the use of any bands except the anchor bands. Emphasis should be made of the fact that we should apply *less* force, and make the adjustments *less* frequently. In carrying out the incisors, we need these fine wires well up on the gingivae. In carrying the incisor forward it may tend to shorten them somewhat. If we have a band with a spur there we can give the wire a bend to the incisal, and as we carry forward we lengthen the tooth. Without a band the spring would slip incisally. I usually use the .020 wire. Where I carry them above the arch I have the gauge of wire a little heavier. I noticed in the last International Journal, an article by Dr. Porter, of New York, in which he shows a different style of attachment. The first thing I noticed was that in the lower he had carried the appliance away low and used it as a base wire, and I saw how he carried it up on the anterior tooth for the auxiliary spring. This was after I had written my paper and sent it to Dr. Power. It is not exactly the same method, but very similar to the method I have used and described here.

REGULATING THE PRACTICE*

BY T. W. SORRELS, D.D.S., OKLAHOMA CITY, OKLAHOMA

THE word "regulate" has concerned us mostly as orthodontists with the placing of the teeth in their normal relative positions, let us now think of it in a still broader scope for usefulness in the conduct of our practice.

It will be my endeavor to offer for your consideration some suggestions and fundamental principles along this line. If they be utilized and applied in a practical way it will mean better efficiency in the building and maintaining of a practice.

Suggested ideas cannot be accepted and acted upon effectively if there is not a normal body mechanism. It is, therefore, obvious that we follow the generally accepted rules regulating health that are of common knowledge to all.

We frequently hear personalities referred to as a great factor in business. "Personality" is generally accepted as being those individual characteristics which distinguish one person from another. As every personality in this sense is made up of changing materials, each one of us has as many personalities as we have groups of associates whose good opinion we value. To every person, we generally show a different aspect of our nature. This being true, it is important, if we are to be cheerful and optimistic, that those about us the great majority of the time be of this disposition.

To have and to hold an assistant who has little or no regard for your habit or established order of doing things is annoying and is reflected in our dispositions. It is likewise quite as necessary that the assistant have not only the general ability but the interest and desire to do the work assigned him in accordance with your plans.

The doctor whose office is dirty and poorly furnished may build a good practice but he is working under a tremendous handicap. He may be personally immaculate but no one will think it if he lives in an ill-kept office. You may be told that a certain store is the best place to purchase the article you need, but if you find the whole establishment has a general air of shoddiness, it will be hard to believe it, without other suggestive things in the way of a trademark or the like, as being manufactured by a reputable firm, and an article of good quality. We would certainly never patronize the manufacturer of food products who posted his advertisements on garbage boxes.

In these days business is done quickly and first impressions go a long way. The average man or woman does not take time for a careful critical or comparative analysis. A thing is not taken out of its environment and set apart for the purpose of analytical study. Arguments are considered in conjunc-

*Read before the Southwestern Orthodontia Society at Dallas, Texas on March 12, 1921, and the Alumni meeting of the International School of Orthodontia at Kansas City, Mo., on July 15, 1921.

tion with the personality and the appearance of the man who makes them. Events are received in the light of surrounding circumstances. It therefore goes without saying that, if this be true, it is essential that we give due consideration to first impressions reflected by ourselves and the office.

We cannot succeed in our special vocation if our interest fails. This may be kept alive by trying to discover new things in old surroundings or new aspects to everyday tasks. Our postgraduate courses and meetings are especially valuable to us in renewing our interest and desire for better things in connection with the practice of our specialty. By reading, attending lectures and clinics, we may get the inspiration, knowledge and skill to do more effective and efficient work.

Here I wish to offer the following four injunctions by Warren Hilton as working principles in the conduct of business:

1. Determine each morning upon one definite thing worth while that you want most of all to do or obtain that day. The being, or doing or getting of anything worth while can only come as a result of an overmastering desire.
2. Do not admit the possibility of your own inability or defeat. It is the state of your own mind that makes for success or failure. Feel assured of your ability to do things and you can go out among men and win them to your way.
3. Keep your attention riveted on the thing you want and your own ability to obtain it.
4. Act promptly in the line of your desire. By following these rules the habit of concentration may be better established and will foster the faculty of pushing ahead even when the case seems hopeless.

If we are to render our greatest service to the public and the profession, we should take advantage of all available opportunities to further educate them to a greater realization of their responsibilities to the child in general, but more especially to its teeth. How frequently do we have patients referred to us with carious teeth who state they only recently had them examined by their dentist! Another very embarrassing question to answer the patient is, "Why didn't my dentist call my attention to this condition much earlier, as the child has been to the dentist a number of times for work?"

The dentists' dislike for children's work and subsequent lack of interest with the problem of child control is seemingly the principal cause of this condition. By dealing kindly, firmly, honestly, and with the proper tact and patience you will be surprised at what may be done with children.

This may be remedied to a considerable degree if we accept the invitations extended to us to read a paper before the local dental society. The growing tendency to give orthodontia little consideration in dental meetings is extremely detrimental and our efforts should be directed toward awakening interest along this line of work among the general practitioners as the responsibility lies largely upon us.

Our activities connected with the establishment and conduct of a practice have followed one another so naturally that we, from force of habit, have not operated separately the two great distinct divisions of the practice. By mak-

ing the proper distinction between the business part and the professional part it is possible to place the responsibility for a number of things for which responsibility has frequently been misplaced. To conduct our practices well it is essential that we accustom ourselves to two lines of thought, one professional and the other business. Along professional lines it is our duty to develop in knowledge and skill so far as circumstances will permit. In business lines we need only use common sense and establish a proper system of records to classify the operating expenses and receipts. We should further have a system of determining the operating time on the individual case as a guide in basing fees. The business part should be governed by a code of ethics to the same degree as the professional part. The ethics of a well-regulated business are of equally as high a standard as those of a profession.

If we are to keep pace with the times and the developments of further knowledge and skill, we must give the proper attention to the business side of the practice or conditions will not permit of our spending the time and money to attend dental meetings and postgraduate courses. These items should be placed in the expense account and charged to our patients, as for more advanced ability, we should advance our fees to those seeking our services.

During the recent and rapid upward trend of prices it came home to us more forcibly than ever before that if we are to have a properly functioning and profitable practice a strict account must be kept of the cost of doing business.

The value of our time is another prime factor to guide us in establishing certain basic fees. By the use of a stamp clock an accurate record may be kept of the number of visits of a patient and the time consumed on each case. The total amount of time consumed on each individual finished case for a year divided by the number of completed cases will give us an average of time expended during the course of treatment. By multiplying this time by the value you place upon your services per hour, an average fee may be determined that will act as a safe guide in making a remunerative fee. A simple method of determining our average fees for a year is to deduct the gross expense from the gross receipts and divide the net income by the number of finished cases. This information may then be utilized in determining and establishing certain basic minimum fees. Our unbusiness-like habits of not basing our fees on the cost of production, with too small a value placed on our time and ability, only too frequently permits us to sell our services without a fair profit.

The great majority of the people applying for orthodontic services are of such moderate means that a high fee may be prohibitive. In order to serve as many as possible and still receive a fair remuneration, a certain minimum basic fee may be established which, in turn, will act as a guide in charging patients of wealth.

Orthodontia, on account of the peculiar nature of the work, allows little opportunity for real charitable work owing to the time and expense involved during the course of treatment. The professional spirit or that attitude of mind which subordinates financial reward to the pleasure of rendering service is worthy of the highest commendation, but must be well controlled in ortho-

dontia. This spirit, tempered with due recognition of the fact that if our time is well filled with patients paying a remunerative fee we can confer quite as great benefits on the public, will allow us to render greater justice to the worker and to those for whose welfare we are more directly responsible.

It is not usual to determine the selling price of an article or service by its value since that is too indefinite, varies too greatly with people in different circumstances and would too frequently make the price prohibitive.

The old dentist who states that the value of dental service is beyond price tells the truth concerning the value of such service. For the child whose narrow arch and crooked septum with a facial deformity to be corrected and the teeth to be placed in alignment and restored to functioning power, the value of orthodontia services is so great that the value cannot be estimated nor often adequately paid for. And for patients of sufficient wealth so that high fees are not prohibitive, the value may form part of the basic fees.

The cost of the operation, including the remuneration on a minimum fee basis, need not be allowed to establish the minimum fee for any case. As the orthodontist increases in resources and skill, with patients becoming more numerous and his time more valuable, he may need to advance his fees and decrease the number of patients. The advanced fees will then represent a compromise between cost and values, with cost as the basis.

IMPROVED METHOD FOR LOCKING LINGUAL ARCH

BY C. E. BERKSHIRE, D.D.S., TAMPA, FLORIDA

MOST of the methods for locking the lingual wire up to this time have used half-round tubes soldered vertically to the lingual surface of the plain molar band. If the tube is allowed to extend to the occlusal region, the lingual cusps of the opposing teeth will interfere, and if allowed to extend gingivally, the spring or lock impinges on the soft tissue.

It is natural that with such a short tube we cannot hope to hold the wire rigid for any great length of time, when the tongue is working in the anterior region trying to lift the wire, therefore I have designed a perfectly straight wire of 18- or 19-gauge, with threads and nuts the same as the old expansion arch, except that it is used on the lingual surface.

Fig. 1.

Fig. 2

After securing a good plaster impression of the case, and the model completed, at the next visit I make plain molar bands and fit them to the teeth in the mouth, remove, and place them on the proper teeth on the plaster model. On the lingual surface of the right molar band I solder a round tube of desired gauge 7 mm. in length *horizontally*, place band back on the model, solder similar tube on the lingual surface of left molar band *horizontally* before placing this band on the model, split the tube *horizontally* with fine blade in the mechanical saw, open the tube with blade of knife far enough to allow the desired arch to lie in *horizontally*.

Fig. 1 shows the model with bands in place preparatory to bending the arch to conform to the unequalities of the lingual surfaces of the teeth; to obtain best results I follow Dr. Mershon's plan as described in *Dental Cosmos* for June, 1920; the wire is now carefully fitted to the plaster model, having the nuts just mesial to the tubes. The tubes should be coated with wax to

protect the tongue, and the bands cemented to the molars. The patient should be dismissed for a few days.

At the next visit the wire is installed. Fig 2 shows the wire entering the tube on the right molar, and being forced distally until the nut touches the tube; if care has been exercised in shaping the wire on the model, it will lie in the split tube on the left molar as shown in Fig. 3, and the nut will be in proper position; if not, I remove and make proper adjustments in the mouth, attach any small springs necessary, squeeze each nut with heavy pliers to prevent movement with the tongue, and install arch as before. With long, small-pointed pliers I close the open tube on the left molar, bending up the ends and corners with foot plugger in the automatic mallet (Fig. 4).

Fig. 3

Fig. 4.

Fig. 5.

With this appliance in place, the tube properly closed, the band will loosen rather than the wire, and having the leverage of the long tubes it is impossible for the patient to loosen the wire with the tongue, the long tube also prevents rotation of the molar. If second molar is present I usually attach a lug to the disto-lingual angle of the molar band, this lug comes in contact with the lingual surface of the second molar, causing it to move buccally with the first.

To remove the wire for adjustment, the tube can be opened with a gold knife or any small chisel, being careful about heavy pressure which might

break cement and loosen band. It is well to remember to measure the distance between the tubes, and see that the distance between the ends of the wire are the same before installing again. Excellent results may be obtained with this appliance especially in Class 1 cases where the patient objects from an esthetic standpoint, bands or ligature being unnecessary on the anterior teeth.

There has been a serious misunderstanding in the dental profession regarding orthodontic appliances, some advertisers would have one believe that most any case of malocclusion can be successfully treated by simply securing one of the many patented appliances, placing it in the patient's mouth, securing perfect results. The success obtained by any appliance is due to the care and attention of the operator, the recognition of this fact will prevent a hasty diagnosis and many failures.

One other advantage of this method of locking the wire is the fact that it is adjustable. If the wire is fitted perfectly to the lingual surfaces of the teeth the nuts may be tightened at the molar tubes and a slight pressure maintained in the anterior region; in case the wire threatens to push up to the occlusal when nuts are tightened I make bands for some convenient anterior tooth, solder a small hook on the lingual, cement to the tooth while the wire is in place, after the cement has hardened I bend this hook down over the wire with automatic mallet (Fig. 5).

In Class 2 cases I use the lingual wire for the lower only, and solder small hooks on the buccal surface of the molar bands to hook the intramaxillary rubber ligatures. In Class 3, I reverse the above procedure.

In all my cases I use the lingual wire as my retainer for the lower and in many cases for the upper, depending on the bite; the tongue keeps this retainer clean, only two teeth being banded, and the patient can brush the labial and buccal without fear of loosening any parts.

OCCLUSION OF TEETH IN RELATION TO THE TEMPORO-MANDIBULAR ARTICULATION

BY RICHARD SUMMA, D.D.S. KANSAS CITY, MO.

THE more successful plan is to move the mandibular teeth forward and leave the condyle in the anatomic position."

"Now, what was demanded in those cases was the forward movement of the mandibular arch with the condyle remaining in the anatomic position."

"By moving the teeth forward according to the above method we are positive that the mandibular arch has been lengthened without the condyle being moved forward."

These quotations are taken from an editorial in the May, 1921, International Journal of Orthodontia and Oral Surgery. Every one who has attempted to correct malocclusions involving a correction of the mesio-distal relation of the molars (which in its finality means a correction of the mesial distal relation of the maxillary and mandibular arches) has met more or less disappointment, usually more.

The dissections and study of the temporo-mandibular articulation conducted by Professor H. J. Prentiss and the writer confirmed the rational assumption that, not only the loss of teeth, but also the occlusion of teeth is recorded in this joint.

Many years ago while this problem was being discussed, a writer used the appropriate phrases of "jumping the bite" and "jumping the occlusion." The former was applicable to an attempt to move the mandibular arch forward as a whole, thus the only change was expected to take place in the temporo-mandibular articulation; the latter, jumping the occlusion, is applicable to moving individual teeth as referred to in the editorial under consideration.

If the observations of Professor Prentiss and the writer are correct, then *every permanent change in the position of teeth is recorded in the temporo-mandibular articulation.*

There is no doubt that jumping the occlusion is the logical procedure for various reasons, but it is likewise logical to assume that an adjustment of the temporo-mandibular articulation is imperative and does take place in the cases where the teeth remain in the corrected positions.

If the nature of the tissues composing this articulation is taken into account, it is not surprising that its adaptation to changes in the occlusion of teeth is very gradual.

While we have no data on hand to make any positive assertion as to the corresponding depth or shallowness of the glenoid fossa in various types of malocclusion, the writer will hazard the opinion that in distal mandibular occlusions, a shallow glenoid fossa and rather flat condyle will prevail. To retain teeth which have been changed from a Class II, Division 1, malocclusion into a normal mesio-distal occlusion, a deeper glenoid fossa and corresponding condyle will be required.

Does this change take place?

IMPACTED AND UNERUPTED CUSPIDS AND THIRD MOLARS*

BY DR. ALLEN E. SCOTT, SAN FRANCISCO, CAL.

IN young patients with whom we most frequently concern ourselves, there is often considerable doubt as to whether a tooth is impacted or simply has not erupted. In this paper it is assumed that an impacted tooth is one that will not or cannot erupt in the course of time, while an unerupted tooth is one that will erupt either in or out of its normal position if sufficient time is allowed to elapse. This statement applies, of course, to dentures where no orthodontic treatment has been given. When space is produced for an impacted tooth it may then become an unerupted tooth. While it usually happens that premolars will erupt when sufficient space is provided, the same statement does not hold true of canines.

There is no doubt that the human denture is undergoing a change. This is probably due to the nature of our food as well as the mode of taking it. There seems to be a great tendency toward the elimination of the lateral incisors; the absence of a premolar is by no means an uncommon occurrence.

Impacted teeth usually result in considerable discomfort to both patient and dentist. If let alone they are apt to cause considerable pain by pressure on nerves; they may result in the formation of a cyst; or in the event that they are left when other teeth are extracted, they sometimes erupt under a plate or bridge. When this occurs, their removal is usually necessary and the construction of a new plate or bridge is usually indicated. From this it is quite evident that an impacted or unerupted tooth should receive our attention.

We are probably called on to deal with impacted maxillary canines and mandibular third molars more than any other teeth in the mouth. The treatment of these conditions is very different. In the case of the canines it is usually desirable to move the tooth into its proper position, while in the case of third molars, with the exceptions as stated later on in this paper, it is desirable to remove the tooth. Due to the position of the third molar, it is a very hard tooth to keep clean and therefore is usually subject to an early attack of caries. When it happens that the second molars are badly decayed or have been devitalized, it is often considered best to advise the extraction of the second molars and allow the third molar to come forward into the space created.

It is rather difficult to draw a distinct line of demarcation between the impacted canines that can be moved into position and those that have to be

*Read before the Pacific Coast Society of Orthodontists, Portland, Oregon, Feb. 16-18, 1921.

extracted. But in general the treatment is dependent on about three conditions:

1. The position of the tooth or the distance to be moved.
2. The age of the patient.
3. The condition of the teeth in general.

In some cases the canine is so high in the substance of the maxillary bone that it is an extremely difficult operation to successfully place a pin in the tooth. The determination of this should, of course, be left to the judgment of the surgeon. Without very much data to substantiate the statement, I think that it is feasible to move into position most any canine in which it is possible to place a pin for the attachment of an appliance.

In these cases the Mershon appliance is used. The base wire is bent in such a way as to allow the canine to come into position. An auxiliary spring is soldered to the base wire in the molar region. This is attached to the pin by means of a piece of wire ligature and the patient dismissed for about a month. The tooth usually moves very slowly at first, due to the simple fact that both crown and root are in bone substance. But when the crown has been moved into soft tissue, movement takes place at the ordinary rate that we are accustomed to move teeth. When the crown of the tooth is sufficiently exposed, the pin which has been placed by the surgeon is removed if possible. If it is not possible to remove the pin, it is cut off and a band placed on the tooth. From this point on, the same treatment is followed as would be used when a tooth is in ordinary malposition. In operating on these cases Dr. James G. Sharp uses a threaded wire the same size as the drill. By following this technic the pin is securely placed and very little trouble is experienced by the pin's being loosened and coming out.

From our present knowledge mandibular third molars seem to be impacted in increasing numbers. This is in all probability due to a tendency of the human race to use the jaws less and less for mastication as civilization advances. There seems to be no doubt that a great many of our dental defects are due to our mode of living under our present state of advancement. It appears that nature does not develop enough bone to properly accommodate the third molar.

In young patients an unerupted third molar is apt to be taken for one that is impacted. In patients ten or twelve years of age these teeth usually slant somewhat to the mesial when they are occupying a normal position. It has been shown in numerous cases that mandibular impacted molars may cause the anterior mandibular teeth to rotate and lap. In these cases, of course, their surgical removal is indicated. However, where it is desired to obtain forward movement or development of the mandible it is not desirable to remove these teeth until late in the period of treatment. With a retaining appliance in place so as to prevent crowding of the anterior teeth the pressure of the impacted third molar will be exerted in such a way as to crowd all the mandibular teeth forward. In this connection it is well to remember that the longer the teeth are left in position, the more developed the roots become and their removal is rendered more difficult and complicated.

DISCUSSION

Dr. W. R. Dingham, Portland, Oregon.—I have gone over Dr. Scott's paper and agree with him on practically all of his points. The movement of impacted canines is accomplished in several ways, but I think the method wherein the lingual appliance is used is the best as from it you can get practically any direction of force that may be required. Very often the impacted canine cases are in older patients and for the purpose of maintaining the space and giving a better appearance, a canine facing can be soldered to the lingual appliance and the space thus maintained and the appearance improved while the impacted canine is being brought down. This form of appliance can also be used in impacted incisors. Where you have soldered a facing on the lingual appliance, in the case of impacted teeth, the lingual appliance and facing also serve a valuable purpose in giving you the relations of the teeth and parts when taking an x-ray. By taking a picture through the top of the skull so as to give an occlusal view of the teeth and appliance, the impacted tooth can be easily located, if pictures of the other usual angles have been taken. Before the use of the x-ray, we cut into the tissue, tried to locate the tooth, and very often we missed it. I was timid about cutting away very much of the process at the time I was trying to locate these teeth. It was my practice to make a very small opening and try to put a pin into the tooth, feeling sure where it was going and the direction of the tooth. Now with the aid of the x-ray we can go in and open the entire area and expose the crown of the tooth and determine positively the direction of the tooth. By removing a good portion of the bone from in front of the crown, the resistance to the tooth movement is lessened and the tooth responds more rapidly. There are several different methods of attaching to the impacted teeth. Dr. Dunn has one I have never seen before. Some men are able to put a band on a tooth even when it is deeply imbedded in the process. Dr. Engstrom explains how he gets a band on a tooth and cements it in position, which plan does not injure the tooth as does placing a pin in the crown.

There is no question but that the impacted canines cause much trouble from pressure, thereby producing reflex nervous conditions. They also cause absorption of the roots of the other permanent teeth. I recall one case similar to the one Dr. Scott speaks of in which the complete absorption of the lateral incisor root was produced by an impacted canine. The question of the age of the patient is an important feature in this work. The older the patient, the greater the difficulty in bringing down these impacted teeth.

Dr. C. O. Engstrom, Sacramento, Calif.—The procedure I have used for many years is about the same as that explained by Dr. Scott. However, I use a cap instead of a band, as the doctor has just stated. My idea is not to mutilate the tooth at all. The cap can be cemented to the surface of the tooth, and sufficient pressure may be exerted to move the tooth. In one case I treated, it was necessary to place a cap on a canine, which was located, it seemed to me, fully a half inch within the outward plate of the superior maxillary bone. It was a considerable distance. I cemented a cap on the tip of the canine and moved the tooth out sufficiently so that it might be banded. I think the next paper on the program will describe a method very similar to my own.

Dr. William Cavanagh, Portland, Oregon.—I fear we may be guilty of perpetrating a crime on the third molar in orthodontic treatment sometimes. If we begin the treatment of a case at the age of six to twelve years, the development of the jaws is forward. I believe when we think we are stimulating the development of the jaws in a certain direction that we are retarding them in another. My opinion is that when we place stationary anchorage on the permanent molars, for a period of years for the purpose of producing lateral development, we are prohibiting a growth of the arches in a forward direction. The third molar, as Dr. Scott stated, has a forward direction in early life and only assumes an upright position when the jaws develop forward and the second molar moves anteriorly and allows space for the third molars to erupt. If we prohibit the forward movement of the third molar we have stopped the normal action and purpose of the inclination of the third molar; namely, to assist the forward development of the arch in keeping with the cranium. So, I fear that we have been stopping development in certain

cases that would have occurred but for the appliances that were used. I will ask whether any of you have ever heard a theory as to why we get these abnormal inclinations of these canines? There are so many cases in which the cusp of that tooth is almost at a level with the root. We have other theories as to why other malpositions occur, but I have never seen any reason why the canine should assume such a perverted position.

Dr. Chas. C. Mann, Seattle, Wash.—I remember one case where the x-ray pictures showed the canine apparently coming down into correct position. The deciduous canine was in position, and the arch was approximately normal. The patient did not want the deciduous tooth extracted because of appearance; so we left it, depending upon the x-ray for assurance that the deciduous tooth would absorb and the permanent tooth come into the arch. Neither one of those things occurred. Later we made another picture, in three or four months, and the root of the deciduous tooth had deflected the crown of the permanent tooth and it was lying almost horizontally across the other tooth. It eventually passed the median line and was extracted. I believe the extreme inclination of the canines is due to a general lack of development of the arch. Being the last teeth to erupt, they are easily deflected from their course. My experience with an impacted central may be of some interest. In one case the oral surgeon made an incision and removed the process and I started the movement of the tooth. However, so much bone had been removed that it never regenerated. Although the tooth is in position it seems hopeless, as the bone has never developed around it. So I would caution you in regard to removing too much bone in the intermaxillary region.

Dr. H. L. Morehouse, Spokane, Wash.—I would like to answer Dr. Cavanagh's statement with regard to the impacted third molar. As you know, the impacted third molar is my hobby. I think I have stated before that in many of our Class II cases, with prominent canines, or what is termed receding incisors, that condition has been brought about to a more or less degree by the natural, as Dr. Cavanagh explains it, development due to the force of the erupting second and third molars. I say this from experience with my own daughter's teeth. I treated her teeth at five and one-half years of age, making the necessary expansion for the eruption of the permanent set. I was careless in watching the mouth at the time of the eruption of the second molar. The eruption of the second molar forced mesially the entire line of teeth, premolars and canines to a minor degree. After that, I made radiograms of the third molars, and found she had both maxillary and mandibular third molars impacted at fourteen years of age. I feel that there is possibly a very slight chance of checking that mesial development that is expected, or which we used to be taught is to be expected from the mesial inclination of the second or third molars. If you will make x-ray pictures of your patients' jaws from six years right along, if you cannot tell at the time you first find the germ of the third molar showing, that you will have an impacted third molar, then I am very much mistaken. If the tooth is going to be impacted, it will show at the commencement of development of the tooth germ. It follows along the same line as the impacted canine. Why do these teeth lie sometimes horizontally? We can answer this only in one way to the patients. The germ is deposited on that angle, in that direction, and that is the direction in which the tooth will erupt. It is a slip in nature, to the same extent that the cleft palate in the majority of instances is a slip. Cleft palate is not always due to disease. It may be a threatened miscarriage, or something of that kind. So we have the same thing in the malposition of the canine teeth, I think; but with the third molar, while there is a chance if you will allow the distal movement of the second molar, you may get added impaction, and, as I said in a paper a year ago, the impaction may be due to opening up spaces for upper premolars.

Dr. P. T. Meaney, Portland, Oregon.—The abnormal positions of the canines (especially the maxillary) are due, I believe, to a lack of length in the arch, mesio-distally. The lack of length is the result of premature extraction, or loss of tooth structure by decay, of the deciduous canines, also first and second molar.

As early as the third or fourth year of the child's life, the first permanent molar is exerting a force which causes the first and second deciduous molars, also canines to move toward the point of least resistance which is mesially, thereby lengthening the arch.

If the mesio-distal diameter of the deciduous molars and canines is destroyed by caries or these teeth are lost by extraction, the mesial movement of the first permanent molar is the result, occupying a position mesial to the normal, approximately the width of the lost tooth or tooth structure and more or less so in the mouths of youngsters under eight years old; after that age the premolars are a resistance to mesial movement of the first permanent molars.

The above lack of length of the arch will not accommodate the permanent canine, therefore it is deflected labially or lingually to its normal position.

The position the canine maintains in the arch is a solution for its easy displacement, where it has not sufficient room for normal eruption.

The fact that the canine is a penetrative and prehensile organ is also a reason why it assumes many abnormal positions in the arch when forced to erupt in arches not developed normally.

Dr. E. C. Reed, Long Beach, Calif.—I would like to ask, since we are speaking so much with reference to the forward movement due to the eruption of the third molar, is there not a change in the angle of the mandible, changing from a more or less obtuse, to more nearly a right angle, thus providing a posterior development of the jaw, giving additional room for the accommodation of the teeth?

Dr. Charles C. Mann, Seattle, Wash.—I wish to take issue with the president's theory that the misplaced canine is the result of misplacement of the germ of the tooth at the time of its formation, as it is laid down in the membrane of the individual.

Dr. Morehouse.—I referred primarily to the horizontal position in which the canine teeth are found, and not to minor deflections.

Dr. Mann.—Possibly I misunderstood you, but the fact remains that if we accept a theory of that sort we must set aside many other things we have been led to believe by experience of the past, as contributing to the normal development of the arches. These things are related one with the other. So, if we are to accept the theory that these things are prearranged, we might as well discard the other forces which we think play a part in the development of the jaws. I feel as Dr. Reed does, whether we care to accept it or not, that there must be some posterior development due to a change in the angle of the mandible; there must be some compensatory development there that increases the space for the third molars in these cases. I believe it might be well to go a little more slowly in our treatment and ascertain by the use of the x-ray whether these third molars have been impacted prior to our treatment, or whether by hurrying the treatment in the anterior region of the arch and exerting distal pressure we did not tend to impact the third molar that had originally only a slight inclination.

By the continued use of the x-ray, we can determine fairly well the possibilities of the third molar coming into correct position. I have observed where you have the mesial marginal ridge of the third molar caught gingivally to the contact of the second molar that the third molar will not come into normal position, but if the mesial marginal ridge of the third molar is occlusal to the contact point of the second molar and there is no backward pressure on the second molar, the third molar will assume a normal position. By using the second deciduous molars for anchorage in as many cases as possible, we are less liable to displace the first permanent molars distally.

Dr. Morehouse.—I want to make myself clear as to the cusps. I think the theory that I advanced with regard to the canine that was impacted to the degree of being horizontally placed with the cusp lying at right angles to the root of the centrals—

Dr. Mann.—Did you have an opportunity to observe it at the beginning of the formation of the canine?

Dr. Morehouse.—When the root was one-half or two-thirds formed. We sometimes find a supernumerary germ completely reversed in its root direction. Here the same theory would apply. I have x-ray pictures of a maxillary supernumerary tooth germ that lay with its root headed downward instead of upward. We had one the other day, a completely

formed lateral incisor, a supernumerary, with the root pointing where the crown should be. On the same theory the germ was laid down that way and it will grow that way in spite of anything.

Dr. Mann.—We, as orthodontists and general dentists have not had as much experience and study as we need. I do not think a rare exception would prove the average rule.

Dr. W. E. Dingham, Portland, Oregon.—In what percentage of cases do we have an impaction of the third molars at an early age? I have difficulty in determining when a third molar is impacted in a young patient.

Dr. Morehouse.—I have not had the time this year to do the x-ray work on younger patients which I had hoped to do. I never start a case of malocclusion ten to twelve years of age without having x-rays for third molars, especially if any outward tendency toward impaction is in evidence. It would be very interesting, and I would suggest that some members who have a little time would start in at six and follow up a few cases that indicate the possibility of impaction, following them from year to year, and see how they develop. I am positive the third molar is misplaced at an early age. I am going to prove it some day, but I have not had time this year.

Dr. E. S. Baldwin, Spokane, Wash.—In the line of hypothetical theorizing on causes of canine displacement you may assume that the pressure of the erupting tooth causes absorption of the deciduous tooth. Now in most cases that we see, the incoming canines have a tendency, if there is a crowded condition, to erupt labially or lingually to the deciduous canine. This might be on account of the conical shape of the permanent canine which gives very little contact surface to exert the influence for disintegrating the root of the deciduous canine. And if that incoming tooth does not strike the deciduous root with sufficient contact to cause disintegration, it passes that root by, and starts in a deflected course. In many cases where you have impacted canines, the deciduous canine roots exhibit practically no disintegration, and the permanent canines lie laterally to the vertical direction of the deciduous root. The canines are peculiar in the manner of eruption and in the way the deciduous roots are sometimes retained, and the ease with which the retained roots deflect the permanent tooth. If, as the result of an early x-ray diagnosis, we would extract the deciduous canine it would aid materially in correcting that condition before the permanent tooth is deflected beyond hope.

Dr. Scott.—The whole thing reminds me of the conversation with a man who has to do with a weather bureau. He says "It will rain tomorrow." "How do you know?" "The barometer is going down." "Why." "Because the air pressure is going down." And that is as far as we get. These teeth are out of normal position because the germ is misplaced. Why is the germ misplaced? We do not bring our argument to a successful conclusion. We do not get anywhere. Since the normal position of the canine is between the lateral and the first premolar it may be during the forward development of the arch these teeth move forward, and the canine being placed high in the bone, does not come under that forward influence and is left behind in the development, and when it does erupt it erupts out of its normal position.

It is certainly more desirable to place a cap or some sort of a band on a tooth, such as Dr. Engstrom and Dr. Dunn have referred to. You cannot always tell exactly the position of the crown. Some years ago a man operated for Dr. Suggett, putting a pin in the root of a tooth, instead of in the crown. The third molar has become more and more interesting as we have studied it, and our studies on it are not exhausted by any means. We have to reckon with this tooth more and more as we proceed. It occurs to me the reason for some of these things may not be so particularly necessary unless they lead to the removal of their effect. One more thought, as to the age for the removal of these third molars. In our office, we sometimes leave them in some little time, but you must remember the roots are being developed all the while, and the longer they remain, the more difficulty one may have in their removal.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

RADIOGRAPHY IN THE EXAMINATION OF SUPPURATIONS AND DENTAL FISTULAE*

BY DR. PONT,

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AND DR. JAPIOT,

Chief of the Laboratory of Radiology at the Hotel-Dieu of Lyons

IN recent years, the important rôle that bucco-dental infection plays in general pathology has finally been recognized. In cases of gastric trouble, blood poisoning, and ocular diseases, the attention of the physicians is turning more and more to the gingivo-dental region.

As far as pyorrhea is concerned, nothing is more simple. The diagnosis is easy. It is only necessary to examine the mouth in order to recognize the disease. Often, however, fistulae exist the dental origin of which is unknown. These fistulae, which play so important a rôle in infection of the organism, not only have to be discovered, but their cause has to be accurately diagnosed. In diagnosis, radiography gives us exact data which serve to complete the clinical signs which are often insufficient. To illustrate this point, we will set forth in this article a number of case histories in which radiography has been of great assistance in permitting us to make an etiologic diagnosis. Thanks to this accurate diagnosis, we have been able to institute rapid and decisive curative treatment. This treatment need not always be extraction; indeed, it should tend toward conservation of the teeth.

It can be readily understood that the anomalies of dentition, dental impactions, the abnormal evolution of the third molars, as well as certain apical affections, the existence of fractured roots, foreign bodies, etc., can all be the

*Translated from *La Revue de Stomatologie*, 1920, No. 10.

causes of buccal suppuration. When etiologic diagnosis is difficult to determine clinically, we take recourse to radiography.

We do not insist on a certain technic which should be followed in the radiographic examination of the teeth. We usually use two methods in France: the extra-buccal plate for the study of the inferior molars; the small intra-buccal plate for the other teeth. The less penetrating rays permit the retention of the structure of the tooth and the neighboring bone.

The lesions revealed by the plates, in the various cases that have come under our observation, are of different kinds, and their aspects are either clear or very variable.

It may be a fractured root abandoned to run the course of an avulsion. If the lesion is not too old, and the root has not yet been altered by the course of the suppuration, it can easily be recognized by the characteristic shadow of the radicular canal.

If the lesion is old and the root very much altered, it becomes difficult to distinguish from a sequestrum (Obs. 1), especially if it is surrounded by a zone of osseous rarefaction. We recall, in the case of one of our wounded soldiers, that the shadow given by the radiogram could not be identified except during the operation; it proved to be a fragment of rock as opaque as osseous tissue.

In short, the plate frequently reveals a zone of infection, generally very small, at the apex of a tooth whether the tooth has been suspected or not. The small apical cysts, the granulations which develop from contact at the infected apex, are revealed very clearly on the plate. Tissue which is less dense than osseous tissue is easily traversed by the rays. It is inscribed in black on the negative, in white on the positive proof, in the form of a small round pocket at the contact of the apex. The size of this pocket varies from that of the head of a pin to that of a hazelnut. (Obs. IX.)

A veritable lesion of the bone can exist, a focus of osteitis at the point of contact with the infected tooth. The osseous tissue is rarefied or is destroyed at the base. Still, many times, on the other hand, the tissue becomes less dense, more permeable to the rays, and reveals its image in gray or in black on the negative, in white on the print. In this way one can appreciate the extent of the focus of osteitis, its relative location to the root, or, on the contrary, to the several teeth in the neighborhood of the neck of this tooth, etc. In certain cases where the clinical diagnosis is difficult, radiography permits the discovery of a tooth which does not seem to be affected, or it shows that a neighboring tooth is involved in the focus of osteitis.

If the lesion is far advanced, a sequestrum which is often difficult to differentiate from a necrosed root, can be perceived. Moreover, the plate may reveal a spontaneous fracture from necrosis of the maxillae. (Obs. VIII.)

Finally, the plate may reveal the cause of infection to be unknown or only suspected dental impaction (almost always a canine) (Obs. III and IV) or a third molar the position of which is malignant or is in abnormal evolution. (Obs. VI, VII, VIII, IX.)

OBSERVATION I.—M., a physician, suffered in 1903, while in his regiment, the avulsion of the first left molar.

In 1910 a fistula in the gingivo-jugal groove at the base of the second molar which had appeared perfectly healthy became apparent. The first radiogram seemed, at this period, to furnish little information. It revealed only a small black point at the alveolar rim, and it was thought that this point was a third molar.

In 1913, the patient suffered successively the avulsion of the second molar, then the third molar; finally, a succession of curettements was attempted which resulted in nothing. In October of 1912, we took a radiogram which revealed at the base of the alveolar rim a cavity surrounded by a small osseous fragment (sequestrum or root?). This fragment of root, being necrosed, seemed entirely abnormal; examination proved this not to be the case.

After the war, we saw the patient again. The fistula was still in the same state. A new radiogram showed the lesions more accentuated and more characteristic, the cavity larger and more regulated, the fragment of root, although without apparent structure, was more clearly visible (Fig. 1).

Operation the 26th of February, 1920: The bone is very dense, and in order to bring it to light, it is necessary to raise the second premolar. After much difficulty and after trusting to the data gleaned from the radiographic examination, we finally uncovered the cavity where we detached an important fragment of root; this was nearly unrecognizable. It had a very irregular surface, as though decalcified by the long suppuration.

Fig. 1.—Dental fistula dating six years back. The radiogram showed the presence of a necrosed root. Avulsion of the root; immediate healing of the fistula.

The radiographic examination was complicated in this case due to the fact that the fistula, on account of long continued suppuration, and because of the change of form and structure of the sequestrum which it has carried off, bears no relation to the root of the tooth.

Nevertheless, the radiogram, followed by several interventions, permitted us to fix the cause of the suppuration and indicated the surgery to follow. It can readily be seen how an early radiogram, skillfully taken at the time when the root has not yet become altered, gives information very easy to interpret and, on the other hand, permits the surgeon to make an easy intervention if the maxilla has not yet become modified.

OBSERVATION II.—Mme. D., carried for six years a fistula at the base of the left superior premolar. This tooth had always been correctly treated and disinfected. We attempted to disinfect the fistula in the usual manner by making an injection in the alveolus in order to get the liquid to the fistula. This treatment was to no avail. On the other hand, the incisors appeared to be healthy, and the cause of the suppuration escaped us.

The radiogram revealed very clearly the extent and location of the lesions (Fig. 2). The root of the premolar was altered and surrounded by a zone of strong infection which promotes the rarefaction of the bone. Furthermore, the clinically sound tooth was also tainted, and the apex plunged in the infected zone at the contact of the root with the premolar.

On account of these indications, the canine was bored. The root was found to be infected, but it was drained by the alveolar cavity and the fistula. The day of the examination, the fistula was dry.

In this case, the clinical examination in no way permitted us to suspect the lesion of the canine which was the veritable cause of the fistula. The radiogram, furnishing this new idea, allowed us to institute the exact treatment for the damaged point, that is to say, on the apex of the canine, and to bring about very simply and very rapidly, the cure of an old suppuration.

OBSERVATION III.—Mme. F., 72 years old, is completely toothless in the superior maxillary, and has been for several years. Her prosthetic appliance, which she had had for four years, gave her a good deal of trouble and was insecure during mastication. The apparatus was old, having been repaired several times; we thought it best to give her a new one. Nevertheless, and in spite of the fact that this new appliance was constructed in the most approved scientific fashion, it gave no better satisfaction than the old one, and was the cause of just as much trouble. In fact, at the end of several days, the pain was so great that the patient declared she preferred her old appliance to the new one.

Fig. 2.—Dental fistula six years old at the base of the first premolar. The radiogram showed that the root of the canine was also in the focus of infection. After the extraction of the canine, the fistula healed.

Fig. 3.—Prosthetic apparatus troubled for four years, fistula. Radiogram shows an impacted canine, the cause of the suppuration. Extraction; the suppuration dried and the appliance was resumed with satisfaction.

Then, when we carefully examined the mouth at the painful area, we found, by pressing it, a small drop of pus. We examined the base very minutely and found, a little to the right of the median line, five millimeters to the rear of the alveolar crest, a small fistula, hardly visible. In our exploration with a probe, we came upon a strong and resistant body. Having already observed two similar cases, we resorted to the radiogram thinking it was an impacted tooth.

The radiogram revealed the presence of an impacted tooth, certainly a canine, lying lengthwise along the alveolar border. Furthermore, in front of this and at the base of the incisors, it had created in its immediate neighborhood, a zone of rarefaction and osseous destruction about as large at the point of osteitis as a hazelnut (Fig. 3).

In this case, we were again assisted by the revelation of the radiogram which showed us the presence of an impacted canine, thereby showing us how to go about drying the suppuration.

Under local anesthesia, we cut into the gum and uncovered the root of the tooth by means of a tenotome. Extraction was then simple, rapid, and practical. The results of the operation were very satisfactory. Several days afterwards the patient resumed her old appliance which served very well. Eight days afterwards, the cicatrization and the suppuration were perfect.

The clinical diagnosis was all the more difficult since the old appliance had been provided with a Contenau suction apparatus which had puffed up and congested the gum.

The suppuration could be supposed to be due to a focus of osteitis with lesion and detachment of the gum.

OBSERVATION IV.—M. L., fifty-four years old, had a series of maxillary troubles, and had had extracted, in succession, all of his upper teeth. Six months later he had the central incisors extracted; two months later, the lateral incisors.

After this last extraction he suffered a thickening of the gum at the anterior part of the superior maxilla, and a fistula was established. This swelling had the appearance of a tumor in evolution and had it not been for the fistula this diagnosis would have been made.

The patient continued to suffer. An area, painful upon pressure, existed a little to the posterior of the alveolar border.

Through experience with a preceding case, and two case analyses, we discovered, in our exploration with a probe, the presence of a hard, round body. We believed this to be an impacted canine. To confirm this diagnosis and facilitate the treatment, we took a radiogram of the anterior part of the right superior maxilla. The plate showed, as has previously been observed, the presence of an impacted tooth, very probably a canine, lying horizontally along the alveolar border. The crown was irregular as though eroded, probably

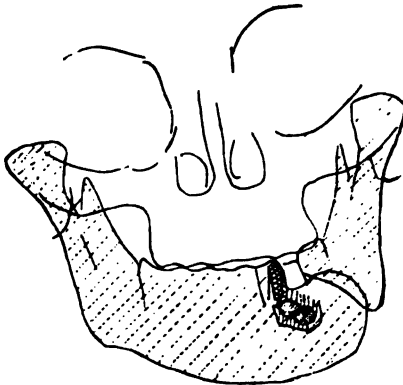


Fig. 4.

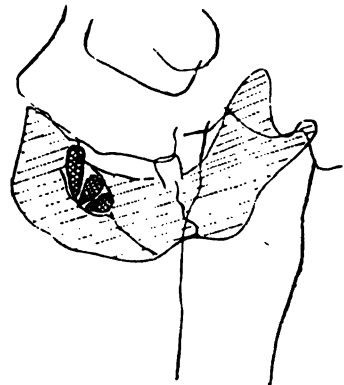


Fig. 5.

Figs. 4 and 5.—Double fracture of the inferior maxilla dating back fifteen months; fistula persisting. Radiogram. The canine is endangered by the drawing of the fracture; the two premolars are encysted in the maxilla. Danger of avulsion of three teeth. Healing of the fistula.

having been infected for some time and decalcified under the influence of the suppuration. Extraction, as in the preceding case, was practiced under local anesthesia and the patient convalesced in a short time.

OBSERVATION V.—Marc B., twenty-four years old, in the 54th artillery, was wounded the 21st of February, 1915, by a splinter of granite.

A starlike scar was left in the chin region to the right. An old fracture, knitted without displacement, was in the inferior maxilla, but a fistula, with suppuration, persisted at the base of the right canine.

Radiogram (May 18, 1916) indicated that the canine was in contact with the focus of fracture, and revealed in its neighborhood the presence of two encysted teeth in the maxilla (Figs. 4 and 5).

Extraction of the right canine. Persistent suppuration.

September 4, 1916.—Parallel incision at the inferior border of the maxilla. We came upon an osseous cavity the size of a hazelnut. We curetted and took away two small sequestra which we remembered having seen in the radiogram, but we could find no trace of the teeth.

September 22, 1916.—This time, we tried something new. We found the two teeth

indicated and extracted them. This affected all the teeth having made secondary projections, been displaced and projected in the focus of fracture, then becoming encysted.

After some time the suppuration dried and the fistula disappeared.

OBSERVATION VI.—M. L., sixty years old, had for two years an abscess with marked trismus. At this time, the second right molar was extracted, this having before been filled. A short time after, a fistula was noted at the base of the gum: we decided to take a radiogram in order to determine whether a root of the second molar which had been extracted still remained in the gum.

The radiogram showed that nothing remained of the extracted molar. On the other hand, we discovered the presence of a third molar impacted in the inferior part of the ascending branch. It was plainly in the focus of infection because it was surrounded altogether at the base of the roots by a dark and characteristic zone. Furthermore, before it and in contact with the crown, a large dark zone existed responding to an important focus of osteitis. (Fig. 6.)

In this case again, the history of the malady, that is, the carrying of a fistula at the time of the avulsion of the second molar by a sixty-year old subject, was of no avail from a diagnostic viewpoint. The impaction of the third molar and the neighboring infec-

Fig. 6.—L., sixty years old, had fistula for two years; suffered avulsion of the second molar. Radiogram showed that the fistula was, in reality, due to an impacted and infected third molar.

tion was uncovered by the radiogram. This revelation permitted the establishment of a rational curative treatment of the fistula.

OBSERVATION VII.—G., a policeman, forty-five years old, commenced to suffer in August of 1914 and entered the hospital with a tumefaction in the neighborhood of the right angle of the jaw. An abscess was incised and the second molar, being suspected, was extracted.

The patient continued to suffer; a new abscess above the hyoid was incised. A new stay in the hospital from the 24th of September to the 4th of November was necessary. There was noted at this time, at the base of the angle of the jaw, a voluminous splinter of bone, seemingly, necrosis of the maxilla. At the time of operation, we found that the angle of the jaw was fractured. A radiogram was taken. The radiogram showed a fracture of the right angle of the jaw; furthermore, there was an impacted third molar at the base (Fig. 7).

There was also, in this case, faulty evolution of the other third molars.

There was also frangible necrosis of the angle of the jaw caused by the third molar. The radiogram made a precise diagnosis possible by showing the cause of the accident; the third molar in the focus of necrosis.

The indications thus received showed that the tooth had to be raised. But the patient evidently also had pulmonary infection to which he succumbed.

OBSERVATION VIII.—M. B., twenty-five years old, had intense gingivitis and severe pains in the locality of the left inferior maxilla to the rear of the molars, for one year; frequent hemorrhages occurred at the time of which the pain ceased to some extent. In June of 1919, a consultation of dental surgeons was called; they did not, however, diagnose the trouble as originating from a third molar.

After a month during which he suffered but little, the patient had his teeth examined. The second premolar was devitalized and filled (the second molars having already been filled.) After four days the entire left inferior maxilla became painful. The infection was thought to be due to one of the filled teeth, having been filled successively without anything abnormal having been noticed. At the time of examination, the left inferior maxilla is inflamed on the surface; a very extensive area of periostitis exists; trismus is present; suppuration has already been established. The patient suffers lassitude, nausea, and diarrhea. As it was found that the infection was not due to the teeth that had been treated, the presence of a third molar was suspected. We determined to resort to radiography to diagnose his real condition. The radiogram confirmed our diagnosis that the treated teeth

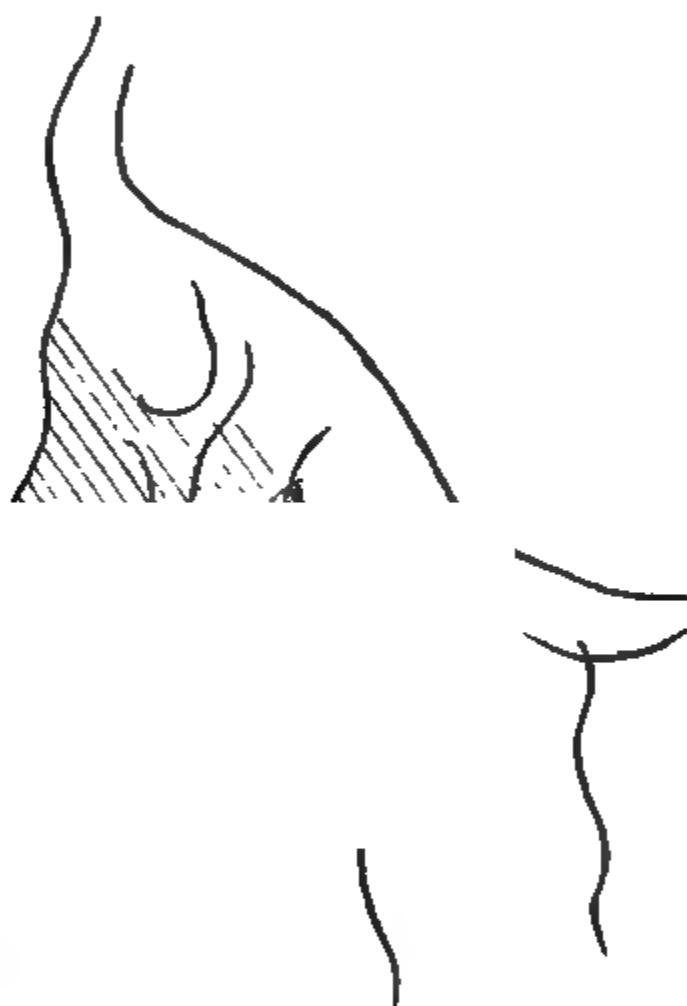


Fig. 7.—G., forty-five years old. Multiple osteitis; spontaneous fracture of the inferior maxilla. The radiogram showed that a third molar in the focus of necrosis was the cause of the trouble.*

were not the cause of the infection. It also showed a third molar lying horizontally along the base of the ascending branch, its crown striking behind the neighboring tooth. Moreover, a visible zone of infection existed in its neighborhood in the form of a dark area two millimeters in size which surrounded the crown at its inferior part. Making use of the facts established by the radiogram, we raised the second molar with the intention of allowing the third molar to evolve normally.

In this case, the cause of the suppuration and the periostitis was located by means of the radiogram at the base of the third molar, moreover, the vicious position of this third molar and the fact of its coinciding with the second molar led us to believe that the same condition might obtain in the opposite side, and it was possible for us to examine the state of the third molar and its possible infection on the opposite side by the same method.

*Illustration taken from Archives of Medical Electricity, October, 1916. P. Japiot: *Radiography of the Inferior Maxillary*. Presence of teeth or parts of teeth in the focus of fracture.

OBSERVATION IX.—M. F. had, for two months, a painful cavity with the appearance of a median fistula in the inferior maxilla. Radiogram showed a zone of apical infection, about as large as the head of a pin, at the base of the two median incisors. The decayed teeth were treated, the fistula dried, and the patient had a new radiogram taken to ascertain the state of the diseased teeth. The new radiogram showed that the zone of osseous rarefaction had disappeared and the maxilla had resumed its natural structure.

These telling observations can leave no doubt of the utility of this method of investigating infectious lesions of the maxillae.

Moreover, radiography is the only thorough method to clear up and determine the diagnosis of all osseous lesions. This point of view holds good also for the maxillae. It is undeniable that immediate radiography of lesions is a timely step; it can, in many cases, prevent the establishment of a fistula. By this means, the precise cause of a lesion can be determined very easily, and an early treatment of teeth that have not appeared to be infected is made possible. Systematic examination into the state of the teeth permits the discovery of structure alterations early enough to limit the possible extent of the focus of infection and permit a very conservative treatment.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Leverage Problem of the Mandible. A. Gysi (Zurich). The Dental Digest, April, 1921, xxvii, 4.

The author concludes his serial article as follows: the mandible is not a failure of nature but is especially well fitted to crush food with the exercise of a minimum amount of force; there is no such an amount of muscle pull required to crush food as was thought necessary when the action of but one-half the mandible was considered; by interaction of second class and third class levers the muscle pull of the balancing side is applied to crushing the food by the working side; the strongest fulcrum-making force is exerted at the balancing condyle, which, sliding slowly backwards and upwards, guides the mandible toward the position of central occlusion until the teeth come in contact. If the form and arrangement of the teeth do not agree with this guiding movement the fulcrum at the balancing condyle is destroyed and the teeth either fail to crush the food or do so only through the exercise of a greatly increased muscle pull. If the guiding action has been rendered unlike on the two sides of the head by asymmetrical loss of teeth the dentist can enable nature to maintain the desired efficiency by arranging the teeth for the guiding movement without readjustment in the temporomaxillary articulation. Nature's effort at this readjustment requires much time, is uncomfortable for the patient, demands excessive muscle pull and at best may be unsuccessful.

The Removable Lingual Arch. J. T. Quintero (Lyons). La Province Dentaire (per the Dental Record, Feb., 1921, xli, 2).

The lingual arch of Mershon consists of three parts, two anchor bands to fix the apparatus to the teeth and the arch proper. The anchor bands may be placed on the molars or the premolars; they are soldered bands. On the lingual surface they have a half round tube soldered vertically. In the tube there is a well fitting half round wire to which is soldered the arch near its extremity. The arch goes from one anchor band to the other, passing along

the gingival margin and following more or less the irregularities of the teeth. To fix the arch in place in addition to the Mershon lock one may use the Angle-Young or Burrill. A few bands and ligatures may sometimes be used if greater stability is desirable. In using the arch the curves may be gradually straightened or auxiliary springs may be used. A more difficult method is stretching the wires by special pliers which have to be changed for each size of wire. Combinations of the three methods may be used in special cases. The lingual arch will doubtless displace almost completely the buccal apparatus and vulcanized plates. Among the numerous advantages of the arch are the following: the operator may make his own bands and arches; no harm results if the patient is not seen for several months and the patient's visits need not be frequent; repairs if needed are readily effected without the delay in getting new apparatus; individual proficiency is readily acquired; the apparatus is well tolerated and does all that any competing device can do: the adjustability of the mechanism is all that can be desired, etc. If there are drawbacks the author has not yet found them. The numerous bands and ligatures of some apparatus can cause caries and other dental troubles.

Orthodontic Education. H. T. A. McKeag. *The Dental Record*, June, 1921, xlv, 6.

The demand for orthodontic treatment greatly exceeds the supply of orthodontists. By demand the author means that parents actively seek to have the children's teeth treated without any propaganda from without. This legitimate demand is often met with the declaration that nothing can be done, although it is as a rule not the dentist who makes such a statement. The postponement and delay in obtaining treatment make it necessary to use very complicated procedures which could have been avoided by timely treatment. However willing the dentist is to sanction orthodontics he has seldom had the training necessary to carry it out. It cannot be taught save in its preparatory and elementary stage in undergraduate schools. In itself a specialty it demands a special college course, necessarily postgraduate in conception. The author has sought such a course for himself but could find none even in the United States. He obtained his knowledge of the subject by private tuition in the United Kingdom and United States. He does not think it absolutely necessary to study in the States. In looking forward to an orthodontic college he does not think it will arrive for a long time and until then one must take the short, intensive courses by practicing orthodontists, such as are given in the States, which last ten or twelve weeks. The entire subject, parts of which can be learned by the undergraduate, comprises the etiology of malocclusion, preventive dentistry, physiopathology of tooth movement and its action on the bone, mechanical principles as applied to the teeth, apparatus in use, technic, etc. Clinical material would be necessary and the author would import one or perhaps two expert orthodontists from the States as instructors. Such might not be superior to the native talent, but should be obtained because of the prestige conveyed by success at home.

Orthodontics. J. Lewin Payne. *The Dental Record*, June 1, 1921, xli, 6.

This paper was the inaugural address before the British Society for the Study of Orthodontics, delivered at the annual meeting last January. This Society was founded in 1907 and the original 42 members have increased to 102. The study is by no means new and a century ago there were two schools of thought and practice, one of which stood for free extraction, while the other was conservative in this respect. Bell, the conservative, regarded Fox, the radical, as a quack for pulling as many as ten teeth in a child in the interest of orthodontia as he understood it. Today instead of merely two there are many kinds of doctrine and practice. Some members individualize treatment according to the indications, while others are more inclined to stick to some system. The interruption due to the long years of warfare has made it advisable to start anew in some respects. There must be a larger membership and the original intention to start a museum should be carried out. There is already a nucleus but it is in storage and not yet accessible. In addition to actual specimens there are models, photographs and radiographs. The Odontological Society owes its success largely to its fine library and museum. Next in importance is tuition and orthodontics should be taught to the ordinary dental practitioner and oral surgeon preferably as a postgraduate subject; for at present it is hardly practicable to give instruction to undergraduates, save in an elementary form. In other words there should be a course of the elements of orthodontia in the curriculum of the ordinary dental college. This subject in the earlier years cannot be presented alone but in association with some of the other subjects, such as the causes of irregular implantation, preventive dentistry, etc. Then in the fourth year there should be a short course—six lectures—by an authority on practical orthodontics. If the graduate would specialize he will of course attend the postgraduate course at the future orthodontic centre or station.

The Teeth and Systemic Disease. W. Gilman Thompson (New York). *The Medical Record*, June 4, 1921, xcix, 23.

The author to quote his own words presents nothing new but as he is constantly beholding many deplorable consequences of neglect of the state of the teeth he feels called upon to call renewed attention to the subject. The previous good health of subjects who present themselves with some manifestation of neuritis or rheumatism so-called is often striking. In purulent focal infection from the teeth, treatment of the latter is often associated with auto-vaccination. In regard to extraction vs. conservative treatment he would practice the former in chronic arthritis or polyarthritis, neuralgic pains, lumbago, persistent extreme muscular fatigue and other similar conditions without apparent cause other than infected teeth. To the preceding list might also be added certain types of cardiac irregularity and undue frequency not referable to organic disease, and gastrointestinal functional troubles. To view matters from the opposite angle periapical abscess, especially when caries or necrosis is added, may be both silent as far as local symptoms are concerned and

without any evidence of any remote consequences in the organism; yet the patient is constantly threatened and this threat may involve life itself. It is well to have radiograms made in all suspicious cases. The immunity of pyorrhea patients is to be attributed to the natural drainage and the author in common with others does not find much focal infection in this class of cases. He mentions a nearly fatal case of pyorrhea in which an abscess which complicated that condition had evidently been responsible.

Local Anesthesia in Every Day Conservative Practice. A. Naismith. Dental Record, February 1, 1921, xli, 2.

Intraalveolar anesthesia, which is associated in the mind with the name of Parrot, seems to the author to be the method in common use. It combines simplicity with almost positive certainty of success. Its directness and definiteness appeals to the practical mind. Parrot first makes an injection into the interdental gum to anesthetize the superficial tissues. He then by means of a small burr pierces the cortex at a point as near the apex of the tooth as possible, avoiding the mobile tissues. Then with a high pressure syringe and thick needle he gently and slowly forces the needle into the cancellous tissues. The author confines both injections to the tough part of the gum and has seen no reason to change this practice. The usual point is just below the interdental papilla. Having injected the gum he pierces the cortex with a fine spear or chisel-shaped drill, pressing it home until the hub of the needle rests against the bone. There are injected from 5 to 10 minims of 2 per cent novocain. The drug rapidly diffuses through the cancellous tissue and the anesthesia is almost invariably immediate. The author uses but one needle for the double injection and the syringe is light and small, for owing to the cancellous structure of the bone but little pressure is required. There are two drawbacks to the intraalveolar method. When the needle point enters the bone there is a slight shock, the patient becoming pale and feeling faint or oppressed. This persists as a rule but a few seconds. This reaction is usually absent in young subjects. The second drawback is some local discomfort after the anesthesia, which hardly amounts to pain. If the needle fails to enter the bone the drilling has not been thorough or a spicula of bone has blocked the needle. The latter must be withdrawn and it and the opening in the bone examined before another injection is practiced.

Relationship Between Ocular and Dental Disease. W. M. Crisp (Denver). Colorado Medicine, February, 1921, xviii, 2.

Some eminent ophthalmologists still deny the influence of dental pathologic conditions on the morbidity of the eye, for not more than 6 or 7 years have elapsed since the eye specialists first began to recognize the existence of such a causal relationship. At the present time the importance of this relationship is perhaps overrated. It is common enough to note that repair of the mouth has no beneficent action on eye affections. Cases occur, however, which show conclusively that the latter may be due chiefly to a dental factor.

Thus in the case of a woman aged 79, when first seen, there was a history of supposed chronic glaucoma dating back 28 years. For about 30 years in fact there had occurred several times annually inflammatory states of one or both eyes. The diagnosis of chronic glaucoma was clearly a mistake as shown by the subsequent history and the examination. The author learned that for a period at least as long as the eye affection there had been an infection of the right cuspid tooth. This was extracted when the woman was 81 years old and in the midst of one of the attacks of recurrent inflammation of the right eye. Two years later at the age of 83 the patient was free from eye trouble. The retrospective diagnosis was chronic relapsing keratitis due to an infected tooth. The author has also seen cases of typical trachoma (really pseudo-trachoma) subside after the removal of infected teeth and cites other cases of atypical corneal disease with the same sequence of recovery. In addition to keratitis there were cases of uveitis, iritis, conjunctivitis—all chronic and more or less atypical, in which removal of infected roots was followed by cure. In a few of these cases a traumatic factor had originally been accused, but failure to heal was clearly attributable to the state of the teeth.

Radium Injuries in the Mouth. Max Cohn. *Zahnärztliche Rundschau*. February 8, 1921, xxx, 6.

This article is a monograph of the entire subject of damage to the mouth by radium and x-rays and has a large bibliography appended. The literature begins about 1903, at which period the metal was used for cancer of the tongue, cheek and buccal cavity in general, and for tuberculosis of the hard and soft palate and gums. At an early period both radium and mesothorium were tested in alveolar pyorrhea. The majority of writers are satisfied with exhorting to caution in the use of radium and but few have reported actual accidents. Although several state generally that accidents are known to have occurred details often fail. A few give cases of necrosis of the soft parts, or perforation, or fistula. The author is certainly one of the first if not the first to report and illustrate a case of beginning sequestrum formation in the lower jaw from this cause. This was necessarily accompanied by necrosis of the soft parts—floor of the mouth and gum. The original disease was chancroid on the inferior aspect of the tongue. Radiation was practiced for a period of five months with numerous long sessions up to 15 hours. Two sound teeth fell out as a result of the radium. As there was no longer evidence of malignant growth the treatment was changed to the x-ray. A few days after the discontinuance of radium the floor of the mouth presented gangrenous bullæ. The ganglia in the neck began to swell and the mustache and beard to fall out. The upper surface of the tongue showed destruction of the papillæ which first showed a peculiar black discoloration that discolored the saliva. Some of the teeth in the exposed area were loose, although others were fast. It is evident that radium can set up a form of superficial glossitis. An intense stomatitis from any cause may under rare circumstances cause necrosis of the jaw, so that the action of radium is not specific in this respect.

Methods of Sterilization in Dentistry. H. E. Harvey. United States Naval Medical Bulletin, April, 1921, xv, 2.

The author gives the results of some sterilizing experiments performed in the Naval Medical School at Washington to determine the qualities in this respect of the glycerine-alcohol solution. The antiseptic quality was tested on the *staphylococcus pyogenes*. New barbed pulp canal broaches were contaminated with an agar growth of this organism and the presence of the latter determined before the application of the solution. The latter was applied at short intervals to different instruments and it was found that an exposure of 10 minutes is necessary to sterilize them. Four series of tests controlled one another completely, the results being quite uniform. An omission in routine antisepsis probably often occurs from failure to sterilize the handle of the syringe used in making conduction anesthesia, etc., and the author advises that the entire instrument, including the finger grip or handle of the plunger, be immersed in the sterilization jar. Although the broaches were used in the experiment the author had in mind especially the sterilization of the anesthesia syringe and needles. There are three possible methods—total immersion, partial immersion with other means of sterilizing the balance of the instrument, and some method not involving immersion at all. An all-metal syringe without washers has been devised with a metal case which can be used in a pinch for sterilization by boiling. The case with contents is filled with water, and an accessory chamber contains alcohol which when ignited heats the water. When dental handpieces for any reason cannot be sterilized in the autoclave they may be dipped by means of forceps into denatured alcohol and the latter burned off.

Effect of Endocrine Derangement on the Teeth. F. W. Broderick (Bournemouth, Eng.) The Dental Cosmos. February, 1921, lxiii, 2.

According to the author enamel is destroyed by acid secretions and dentin by microbic action. Hence if enamel can be protected from acidity the problem of dental prophylaxis is solved. The subject for study then is limited largely to the causes of acidity. The source of the latter must be the saliva itself or the presence of fermentation—naturally of the carbohydrates—in the debris of food. This, however, takes no account of predisposition—of some quality of the enamel which sensitizes it to the action of acids. The body contains fixed lime and floating lime which must serve as a reserve supply. There is a so-called lime hunger syndrome, one symptom of which is chilblains, which may yield quickly to lime feeding but there is no fixed rule. On the other hand fixed lime can become floating lime. From the latter angle lime stored in the teeth may at times be in demand somewhere else in the body. This circulation of lime in the body is usually placed under the domain of the ductless glands. Some of these favor calcium retention, others calcium waste or elimination. Apparently they must act in concert to secure the proper balance. Our knowledge is largely limited to the result of animal experiment and there is evidence that in animals deprived of the parathyroids the enamel is

hypoplastic. Removal of the pituitary glands will sometimes retard dentition, etc. To apply our knowledge to mankind we know that the growing child is dependent on lime and if lime starvation is brought about in any way the teeth are prone to suffer. Childhood and youth is the period of caries. Next to the age factor comes the state of pregnancy in which the lime hunger of the fetus is felt in the mother's teeth, caries being common during that condition. From these predisposing causes the author passes to acid mouth especially in the predisposed to caries. The technic of estimating acidity is very complicated, including the choice of indicators. The results seem worth the trouble for they go to prove a direct connection between caries in childhood and acid mouth. He has made feeding experiments with pluriglandular extracts with the addition of lactate of calcium, using the hypodermic route. Evidence is presented in general that caries can be arrested although the teeth remain discolored. We find teeth at times with marked decay of enamel and intact dentin, although as a rule the enamel first gives way at a small spot and caries of the dentin burrows beneath it. This arrest is perhaps the consequence of a return to normal lime metabolism and equilibrium. The pluriglandular extract used by the author in its final formula was anterior pituitary 3 m, suprarenin (1-1000) $2\frac{1}{2}$ m, parathyroid $\frac{1}{10}$ gr. and calcium chloride $1\frac{1}{2}$ gr. Calcium lactate was also given by the mouth, ten grains at the time of injection. Under this treatment the calcium index increased notably while at the same time there was a marked increase in alkalinity of the saliva. These injection experiments were apparently carried out only on the author by himself.

Common Preventable Defects of Childhood. E. H. Wilkins (New Zealand)
Dental Record. February 1921, xli, 2.

In this article there are numerous references to the teeth. Studies of New Zealand school children show the remarkable frequency and coexistence of caries of the teeth, imperfect development of the jaws and palate, adenoids and enlarged tonsils and rachitic deformity of the chest. He ascribes this entire picture of morbidity to disuse of teeth from the soft quality of the food, and to deficiency of vitamins and mineral matter. There are overcrowding and malocclusion of the teeth, narrow and high palate, narrow nasal chambers and bent septum. This combined state causes mouth breathing and these various conditions react on one another in such a way as to cause vicious circles. In theory at least vigorous mastication of food hard enough to require chewing means a wide palate and wide and roomy nasal passages. Beginning with the time of weaning the child begins to chew soft, pulpy food and continues this practice during the entire period of growth. Even before this too much sucking at the milk bottle tends to narrow the jaws. Undersized jaws mean undersized muscles of mastication and we know that Nature meant these muscles to be large and well developed. Caries can only signify that teeth which quickly decay are made of poor goods and that this is due in part to deficiency in lime: but since feeding with calcium cannot remedy this condition we know that some other factor interferes with the normal

metabolism of this mineral, this being doubtless absence of vitamins. If we could eat the bone as well as the soft part of meat the teeth might benefit by it and this is true of whole cereal grains which contain vitamins and mineral matter and naturally require some chewing. Prolonged cooking certainly destroys all of the vitamins and in preserved foods, as jams, the same result follows. In a postscript the author admits his error in ignoring the molding influence of the lips and tongue in shaping the jaws while the influence of mastication in this respect may have been overrated.

Histology of Dental Caries. E. Retterer *La Revue de Stomatologie*, January, 1921, xxiii, 1.

The author studied in succession sound teeth, superficial caries and deep caries. The teeth were fixed in formol diluted with 4 or 5 parts of water, and decalcified with chlorhydric acid, and the sections were made in paraffin and of the thickness of 7 to 10 microns. The sections were stained with hematoxyline after fixation with perchloride of iron. Superficial caries is limited strictly to the enamel in which the fibers of Tomes are seen to be thicker and more closely approximated, but the characteristic change is the rarefaction of the amorphous substance in the meshes of the reticulum. The author therefore disputes the current view that the mouth acids decalcify the cement substance which unites the prisms of the enamel; for as a matter of fact this alleged cement persists longer than the other structures of the enamel. In general, teeth which are becoming carious are not so rich in hyaloplasm as sound teeth. They are unable to charge themselves with sufficient lime and the hyaloplasm becomes transformed to a granular cytoplasm. The dentine therefore becomes transparent and of course poor in lime; this reduction in mineral matter is extreme—to as little as 1 to 13 of the normal. The dentine, reduced to a granular protoplasm containing hardly a trace of lime, turns brown or black and can resist neither acids nor bacteria. The saprophytes are especially prone to attack it and cause putrefaction. The carious tooth is of course sensitive also to mechanical factors. The essential cause of caries lies in the originally poor constitution of the teeth as shown by a study of the teeth in which caries is beginning.

Surgical Prosthesis in the Operative Treatment of Tumors and Necrosis of the Lower Jaw. Real. *Revue de Stomatologie*, January, 1921, xxiii, 1.

It is more than 36 years since Claude Martin wrote his book on immediate prosthesis, and in the interval little or nothing has been added to the principles or the technic. According to this author the chief object of immediate prosthesis is to antagonize secondary deviations of the fragments of bone, and, so to speak, make the bed for permanent prosthesis. Another object is fixation of the tongue, which must be prevented from falling backward or forward, which accidents are always threatened after large resection of the mandible. A third advantage is the prevention, to a certain degree, of salivation. Martin insisted that immediate prosthesis made mastication possible.

But when all is said this author was overoptimistic as to what could be done by prosthesis. It is true that some of his patients were able to chew a few days after the first intervention. But it is the ultimate result which counts and the author is sceptical of this in cases of extensive loss of bone. The experience of the recent war did not bear out Martin's claims for permanent prosthesis based on results of immediate prosthesis. The error of Martin was in failure to discriminate between tumor and necrosis cases. The author finds that the treatment of these affections should be individualized. There is also a difference between various kinds of neoplasms in respect to temporary prosthesis. Martin and his colleagues did not of course have the aid of the x-ray, and it is just this resource which brings out the differences between tumors and necrosing osteitis, and also between the various neoplasms of the jaw. Martin laid down the dictum that restoration of form was essential to restoration of function, but the war has shown that fair function may follow very imperfect structural restoration.

The author goes into the details of immediate prosthesis after resection of the mandible for neoplasms. Of the 9 cases described by Martin at least 5 seem to have been of malignant disease. Of the five patients three could not wear the immediate prosthesis; a fourth, while doing nicely died suddenly of cerebral hemorrhage. The fifth case is reproduced in full by the author. The resection of the mandible was very wide and the piece of prosthesis was not well borne; the general state became so bad that it was removed and a wire device substituted, until after 18 months permanent prosthesis was installed. Hence, of 5 cases of presumably malignant disease 4 failed to tolerate immediate prosthesis. The 4 cases of presumably benign tumors seem to have given very good reactions to immediate prosthesis, as far as cosmetic effect goes but the author is by no means convinced as to the success of the functional result and is inclined to think that the entire series of cases indicates success from this angle. He asserts that Martin's method is absolutely contraindicated in resection for malignant growth and that it is defective in resection, especially wide ones, for benign growths. On the other hand sarcoma with myeloplaxes, although in a sense malignant, seem better adapted to Martin's method and his success seems to have been obtained largely in such cases, doubtless because of the possibility of making osteoplastic resections. In resections for necrosis Martin also obtained some good results for the same reason.

Surgical and Prosthetic Treatment of Constriction of the Jaws. Lemaitre and Apard. *Revue de Stomatologie*, January 21, 1921, xxiii, 1.

The constriction was total and the lower incisors were in contact with the alveolar margin of the superior incisors. The patient was a soldier of 37 who originally presented a small tumor in the posterior portion of the left gingivogugal groove. The growth enlarged and the clinical diagnosis was epithelioma of the left cheek, which had encroached into the above mentioned furrow and the parotid recess. Radium treatment was at once instituted and a violent reaction followed. Biopsy had in the meantime thrown doubt on the clinical diagnosis of cancer. An incision was made in the aim of giving exit to sup-

posed fluid contents. At the tumor station to which the patient was referred there were noted a swelling at the angle of the jaw, ulceration of the small incision site, total locking of the jaws as mentioned, and an ulcerated surface seen with difficulty in the buccal cavity, which gave off a fetid discharge. The surgeon making a diagnosis of necrosis of the jaw, promptly removed a large sequestrum which involved the angle of the mandible and ascending ramus. The condition was successfully treated without any loosening of the jaws. The x-ray showed the bone defect and a fibrous constriction of the masseter and pterygoid muscles due evidently to fibrous myositis. Serodiagnosis showed that the condition was one of syphilis throughout—a gummosus infiltration of the ascending ramus masseter and internal pterygoid. The first step in the treatment was division of the fibrous band through the natural passages. As it was almost certain that the condition would recur of itself, a device was improvised to hold the mouth open during cicatrization and also permit of nourishment. Healing then took place without cicatricial retraction, the interval being about 12 weeks.

The Wisdom Teeth and Their Removal. Hector Polk (New York). *The Dental Digest*, January, 1921, xxvii, 1.

Illustrating the manner in which wisdom tooth pain is reflected to other portions of the dental arch, the author narrates a case in which pain was referred to the upper right cuspid. This was found to be sound. An x-ray then gave a negative result. Finally a cavity was found in the third molar, facing the distal. The tooth was found to be putrescent and considerable effort was necessary to get the patient's consent to extraction of this tooth in place of the cuspid. In all cases of pain "along the dental arch" the wisdom teeth should be examined. In regard to extraction technic for an upper wisdom tooth in normal position, the bayonet-shaped forceps is very serviceable. In removing, use lateral motion in the direction of the long axis. If the tooth is misplaced and the crown can be grasped, a simple extraction should result. If the tooth should break off at the neck the roots should be separated by a fissure burr and engine. The elevator should never be used, because of the danger of injury to the maxillary tubercle and of forcing a root into the antrum. All are agreed as to the difficulty of extracting lower wisdom teeth. The author is using the elevator more and more. When the use of forceps is indicated, luxation should be antero-posterior to avoid breaking. In using the elevator the dentist should stand behind the patient for a right extraction and near the left side for a left extraction. The point of the elevator should be inserted between the second and third molars with the flat side against the latter and the oval side against the second molar, the latter acting as a fulcrum. To loosen the tooth forward and downward motion should be used and extraction should be made in a half circle with the crown tilting towards the ramus. If there is no first molar a wedge should be made to replace it, from modelling compound. During extraction, this wedge should be held in position with the left hand.

Causes and Treatment of Prolonged Pain Following Extraction and Oral Surgical Operations. B. B. Machat (New York). *The Dental Outlook*. March, 1921, viii, 3.

The author first distinguishes between preoperative, operative and postoperative pain. Naturally the latter may represent the persistence of preoperative pain, as in the case of inflammatory affections especially of the peridental structures. It is by no means necessary to operate in such cases to relieve the pain, which can usually be assuaged by palliative measures or scarification. Only exceptionally must the tooth come out and then under general anesthesia. Nevertheless extraction means that the cause of the particular exacerbation of pain is removed and that the focal infection has been eliminated. On the other hand extraction should be followed by the use of the curette and it is well to do this act in a second stage, after the tissues have become quiet. In such a case general anesthesia will prove unnecessary, and indeed is for several reasons undesirable.

Aside from this type of case with acute, diffuse inflammation of the peridental tissues causing preoperative pain, conduction anesthesia should be practiced. Postoperative pain in these cases is due to some defect in the anesthetic or the technics. The solution to prevent this kind of pain must be isotonic. Technical errors causing postoperative pain are associated chiefly with infiltration anesthesia.

Under the head of exodontia the author, who makes extensive use of the elevator, states that it sometimes causes after-pain. The most difficult extraction is encountered in removing the mandibular first molar from an unbroken arch, especially when the seat of chronic infection or when the roots are long and ribbon shaped. There should be no attempt to extract whole. The crown is cracked off and a buccal flap operation performed. A portion of the alveolar process is chiselled away to admit an elevator between the roots. A slight turn of the flat instrument will split the roots and by using the septum as a fulcrum these may be separately lifted out. This procedure prevents fracture of the roots and injury to the nearby teeth.

The increase of surgical exodontia at the expense of ordinary use of the forceps means more after-pain. The latter should not occur in over 2 per cent of all cases. The dressings may be at fault by preventing drainage. There is a form of delayed pain which appears on the fourth or fifth day, from the stretching of the mucosa tightly over the irregular, angular, hard substratum. In these cases it may be necessary to block the nerve, retract the flaps and trim the projecting or ragged alveolus. Another cause of after-pain is trauma of an adjacent tooth, as when the elevator has been too vigorously used. The pulp of such a tooth is tested and if devitalized the tooth must be opened and the dead pulp removed. In any case the occlusion should be reduced and ligation of the tooth wherever possible, plus the ice pack will afford relief. Other causes of pain are mentioned, as neuralgia following extraction of all the teeth, injury to sensory nerves, infection ending in necrosis, dry socket so-called, etc.

Cholesteatomas of the Jaws. H. Rodier (Paris). *Revue de Stomatology*, December, 1920 xxii, 12.

The author reports seven cases of this rare formation, situated in the upper jaws, alveoli, gums, incisor region, etc. The characteristic finds were signs of old inflammation, cellular infiltration with structure suggestive of tuberculosis, crystals of cholesterine infiltrating the tissues, etc. Evidently there is an inflammatory process which is subacute or chronic and occasionally acute. The cholesterin tends to accumulate in long fissure-like spaces. The author agrees with Roussy in the belief that there is no genuine neoplastic process, but instead an inflammatory pseudotumor. The genus to which such formations belong is the granuloma, as exemplified in the gumma, tubercle, exuberant granulation, the sporotrichoma, etc. The presence of cholesterine is only an epiphenomenon—a type of fatty degeneration. The word cholesteatoma may be retained but should not indicate that the condition is neoplastic. At best the condition is a curiosity and moreover cannot be diagnosed from its clinical history and symptomatology, without resort to the microscope. On the other hand in 30 clinical cases of tumor in these localities in which the author expected to find cholesterin the latter was absent in all but one. A positive find, then, comes in the nature of a surprise. The formations which are apt to turn out to be cholesteatomas are termed clinically granuloma, pseudocysts, proud flesh and the like; but, as already stated, it is only exceptionally that these formations contain cholesterine.

The Impacted Lower Third Molar. C. Edmond Kells (New Orleans). *The Dental Cosmos*, February, 1921, lxiii, 2.

The author's original operation for removing impacted lower wisdom teeth has undergone continuous modification and for the past two years the changes have been radical, in the sense that the postoperative stage has been largely eliminated. After-pain is now regarded as due to the heat caused by cutting through the dense enamel and dentin, and to ragged edges of the socket or splintering the margins of the same. To eliminate the heat of the burn the operation is done under a stream of iced distilled water. An elaborate apparatus for this maneuver is described and illustrated. Five grains of bromural are taken 1 to 2 hours before the operation. Skiagraphs have been used by the author since 1903 and study of them is indispensable. To secure a dry operating field with elimination of hemostasis an aspirating outfit is combined with the refrigerating apparatus and all blood is at once aspirated. The operative field is now cleansed by a special apparatus which flushes the mucosa and extracts all extraneous matter from between the teeth. The old principle of the minimum of injury to the hard and soft tissues is still active. A long flap is made along the lingual border and retracted buccally. The aspirating machine sucks up the blood as fast as it collects. The author has recently devised a flap-holder to take the place of the old retractor, but it is as yet far from perfected. Proctor of Boston has improved on the author's flap so that there is a better view of the operating field. If necessary to go through bone

to get to the tooth, chisels are used. A nick is then made in the enamel to introduce the drill but the carborundum knife used for this purpose should not be used on bone. The crown is then drilled preparatory to cutting the tooth in two, the latter being done by special burrs. This step of the operation is hazardous because several accidents could happen—either one of the plates may be cut too deeply or the inferior dental nerve injured. Refrigeration is begun with the first contact of the carborundum. The suction apparatus and flap-holder must be functioning perfectly. The burrs and field must be kept cold throughout the drilling. As soon as the tooth is divided the anterior portion usually comes away readily. The remaining segment comprises the root and if this be single and conical it can usually be released by driving wedges between the tooth and socket. Under other circumstances chiseling may be required to cut away the bone and enlarge the socket. Driven wedges or elevators may then be used to release the root. When much force is required forceps rather than the elevator should be used. The cavity is then curetted with Kingsley scrapers and the margins are rounded off and smoothed, the flap restored and the socket irrigated with the flourishing apparatus. One or at most two sutures are required. In most cases the operation is of course done under local anesthesia.

Treatment of Deciduous Teeth. A. L. Beischer. *Australian Journal of Dentistry*, November, 1920, xxiv, 9.

The author first cleans the teeth and then applies silver nitrate to the cavities of the incisors, doing nothing further, since the teeth will soon be shed. In the case of the canines the blackened dentine can usually be removed with hand instruments and amalgam or cement fillings put in. In the molars the use of the engine is more common to expose the cavities, using hand instruments for excavation. If the child is afraid of the engine for completing the excavation an oxyphosphate of copper cement will often last quite a long period. For devitalizing the author prefers arsenic. He mentions the chalky type of tooth in which, owing to the painless character, caries may become universal before the dentist is seen. Many of the teeth may be too far gone for filling while others may bear filling with copper amalgam, which however, is very unsightly. Extraction in a young child is always trying, despite the character of its training. For one or a few teeth the author recommends the ethyl chloride spray as an anesthetic. Cotton is soaked in the vapor and laid against the teeth. There is a brief loss of consciousness sufficient for the operation. If there is much extraction to be done the author allows only the anesthetist to appear on the scene, in order not to lose the child's confidence. The child does not see the operator before or after the extraction. While about it he would pull every putrescent tooth, although this is often repellant to do. For some years he has made it a practice to leave only living teeth. In conclusion he states that without nitrate of silver and copper amalgam he would not care to practice dentistry on children.

Caries and Pregnancy. Gerson. *Zahntechnische Rundschau*, January 16, 1921, xxx, 3.

Frieda Gerson, a Swiss dentist, examined the teeth of 50 pregnant women with 50 nonpregnant, nulliparous controls the age period being from 20 to 30 years. Gestation in most of the women was at the second to the fourth month. Six months later she investigated the 100 women a second time. The progress of the caries was recorded in all and a distinction was made between superficial and deep caries. Well filled teeth counted as sound teeth. The number of extractions was also noted. Of the nulliparous women 22 showed superficial caries of the incisors against 30 of the pregnant women; the latter included 9 with carious canines while none of the nonpregnant showed implication of these teeth. The figures for premolars were pregnant women 26, nonpregnant 9 and for molar teeth pregnant 21, nonpregnant 11. The figures for deep caries (involvement of pulp) showed the same parallel. The figures for pregnant women were incisors 10, canines 4, premolars 15, molars 16. The figures for the controls were incisors 1, canines 2, premolars 6 and molars 7. Extractions during the observation period were as follows: two pregnant women had incisors extracted as against no controls; in neither series were canines or premolars extracted. Ten pregnant women had molars extracted as against 2 controls. Coles' statement in 1874 that the premolars suffer most from childbearing is borne out. In the figures for molars it must be borne in mind that some women had lost their six year molars before the observation began. If pregnant and nonpregnant women have the same number of good teeth to begin with the influence of pregnancy on caries is readily seen at a later period—in the author's figures six months.

Hypersensitive Dentine. Wm. Wannack. *Zahntechnische Reform*, November 21, 1920, xxiv, 47.

The term is used to indicate a painful reaction on the part of the exposed dentine of a living tooth to mechanical, thermal, chemical or electrical irritation. The reaction is obtained only in this manner. The exposure of the dentine may be due to a variety of causes, as failure of the protective enamel, caries, an injury, or retraction of the gum from the neck of the tooth. The author belongs to those who deny the existence of nerve fibres in the dentine. It is therefore necessary to suppose that physicochemical changes of some sort affect the protoplasm of the dentine tubules. The action of sugar in causing sensitiveness is attributed to increase in the surface tension. Some inorganic salts have the same property while acids, bases and the great majority of organic substances diminish the tension. Merely chemical influences alone are insufficient to produce the phenomenon. Inhibition, concentration of solutions and other physical phenomena are active. Thus the protoplasm in the dentine tubules being of colloidal structure, exposure of the dentine to the mouth fluids leads to inhibition and increase of surface tension. There can be no change of concentration in the tubules and there is instead a transmission of pressure in all directions. The perception of the pain is really in

the pulp, in Boll's plexus. There is no pain in the enamel, when the drill enters but when the contact point of the enamel and dentine is reached, severe pain is felt. This is best explained by the heat generated by the burr in addition to the pressure. The surface tension in the tubules is increased as the result. After the dentine has become calcified in advancing years pain does not result under these circumstances. The article will be continued.

Peridental and Periapical Surgery. Arthur Zentler (New York). *Dental Cosmos*, February, 1921, lxiii, 2.

The first evidence of peridental mischief is a gingivitis which may be superficial, hemorrhagic or suppurative, the latter corresponding to pyorrhea alveolaris. The author, for the latter condition, prefers a flap operation to scaling, done under novocain conduction anesthesia. In periapical with or without peridental disease the same degree of thoroughness is indicated. A periosteal flap is lifted, retracted and held in place by an assistant. If the alveolar bone which interposes has been destroyed there will be no need of chiselling—otherwise the apex is exposed with the chisel and, if the tooth is fairly solid in the alveolus, amputated. If, however, the tooth is loose, the chisel should not be used to remove the apex but instead the engine and burr. After chiselling, the burr is used to smooth the amputated root end. The curette or knife is then used on the diseased soft tissues about the root and the alveolar plate is chiselled away from the denuded roots which are then themselves curetted: The flap is then curetted on its inner aspect if necessary, before reposition. After swabbing the periapical cavity with iodine, 50 per cent, the flap is finally sutured. In order to obtain satisfactory results from this combined peridental and periapical operation no particle of diseased tissue can be left behind. As the teeth are often left with scant support ordinary orthodontic brass wire ligatures may be applied for 4 to 6 weeks. More elaborate fixation is not desirable.

The Recognition and Treatment of Infectious Conditions Involving the Region of the Third Molar. Harry Bloch (St. Louis). *The Dental Cosmos*, February, 1921, lxiii, 2.

The conditions referred to occur chiefly in impacted wisdom teeth. Inflammatory reactions in the bone are either constructive and progressive or suppurative and destructive. In the former condition the bone hardens before the eruption of the tooth is completed and the latter becomes encapsuled until the new bony tissue has been absorbed. The tooth may or may not be prevented from normal eruption under these circumstances so that impaction may be a result, complete or only partial. Partial impaction may set up a variety of symptoms of varying severity, both local and reflex. In infection the formation of false membrane and sloughing may occur, or ulceration with or without abscess formation or finally progressive necrosis of the alveolus. One of the more serious symptoms is false ankylosis of the temporomaxillary joint. The author says little of the assertion that maleruption of the wisdom tooth is no

more or less than a clinical expression of Vincent's disease, a view advanced during the war, when an epidemic of Vincent's disease in young soldiers exactly simulated the wisdom tooth syndrome. He merely states that in the majority of cases the double organisms of the disease in question are present in large numbers but mentions that ordinarily they are no more than saprophytes. However, he concedes that these organisms may set up periodontal gingivitis, the other alterations developing secondarily. The ulceromembranous lesions about the tooth suggest this etiology. The treatment is chiefly operative but limited to incision and drainage when this is obviously indicated. Radical operation is hardly mentioned and apparently seldom indicated.

Wisdom Tooth Accident in a Man Aged 77 Years. Delguet and Despin (Bordeaux). *Gazette hebdomadaire des sciences médicales*. March 6, 1921, xlii, 10.

For three months the subject had complained of swelling at the angle of the left jaw and the mandible was partly locked. Two incisions along the margin of the jaw brought away pus. When the authors saw the patient he presented a partly cicatrized wound which gave exit to pus. The wound reposed on a thickened substratum at the angle of the jaw which was ligneous in consistency. The indurated area extends to the external auditory meatus and zygomatic process. Examination showed no trace of the large molar teeth. There was, however, an anomalous condition at the site of the third molar which, had it not been for the advanced age, would have been regarded as a wisdom tooth inclusion. The diagnosis of the latter was actually made from a röntgen plate. The tooth was extracted through the natural passage by means of the elevator, using the finger as a guide. The operation, done under local anesthesia, proved to be an easy matter and was completed by the use of the curette. The experience was a rare one. The authors know of four similar cases in which the age of the patient varied from 60 to 76 and can find but one in which the age was greater than that of their own subject. In this case, reported by Pont of Lyon, the age was 84, which is believed to be the record for France. In regard to the mechanism of these cases it must either be purely mechanical or infectious. The presence of an infectious component seems necessary in these cases, although there is naturally a mechanical factor which prolongs the eruption of the tooth and facilitates the infection of the follicular sac.

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EDITORIALS

Occlusion of Teeth in Relation to the Temporomandibular Articulation

IN THIS issue of the *International Journal of Orthodontia and Oral Surgery* we publish an able article by Doctor Richard Summa entitled "Occlusion of Teeth in Relation to the Temporo-Mandibular Articulation." This article contains much truth. Nevertheless, some statements are liable to be misinterpreted in such a manner as to lead to considerable misunderstanding.

Doctor Summa states that "Every one who has attempted to correct malocclusions involving a correction of the mesio-distal relation of the molars, * * * has met with more or less disappointment, usually more." We are aware of the fact that a great many of the older orthodontists have stated during the last few years that the treatment of distocclusion or postero-occlusion, as it should be called, is very often associated with unsatisfactory results. We believe the majority of these failures and disappointments have been due

to the fact that the operator has attempted to change the position of the condyle, thereby changing the temporo-mandibular articulation, rather than to leave the condyle in its normal position.

Doctor Summa states that "The dissections and study of the temporo-mandibular articulation conducted by Professor H. J. Prentiss and the writer, confirmed the rational assumption that not only the loss of teeth, but also the occlusion of the teeth is recorded in this joint." This statement is unquestionably correct, but the trouble lies in the fact that some men will interpret the record in this joint to signify that the condyle can be changed as regards its position rather than as regards its shape. There is no doubt of this fact. It is proved in the study of comparative dental anatomy that the occlusion of the teeth and the shape of the teeth absolutely control the shape of the condyle and glenoid fossa, but that does not signify that the occlusion of the teeth or the correction of malocclusion, by the so-called, "jumping the bite," or attempting to shift the mandible forward, is going to produce a change in the position of the condyle. Therefore, Doctor Summa's statements, while correct, may be misleading to some who have attempted to misinterpret Professor Prentiss' investigations as being proof that the position of a condyle could be changed, which is a statement that Professor Prentiss has never made in conversation with us, and which statement, also, Doctor Summa does not make.

In changing the antero-posterior relation of the arches, such treatment will bring results, which will change the shape of the condyle and glenoid fossa, but not the position, owing to the ligaments which will remain the same. Therefore, as a result of this knowledge, and as a result of the investigations carried on by Dr. A. LeRoy Johnson, given in a paper which he read before the American Society of Orthodontists in Atlantic City, we have no reason to believe at the present time, that, as a result of orthodontic treatment, the condyle can be made to assume a different position from that of a normal and anatomic relation for that particular individual. We, therefore, have to interpret these changes practically the same as Doctor Summa has: that there may be a change in the shape of the condyle and glenoid fossa, but no change as regards anatomical position antero-posteriorly.

Who Should Control Dental Education

DURING the last few years various attempts have been made to regulate and control dental education. Some of these movements have originated from the proper sources, while others have been the result of agitation which has a questionable bearing upon the problems of dental education. With these various movements originating from different sources, it is well to consider what group of men is best qualified to control dental education.

As we review the situation, we find the National Association of Dental Faculties has made some suggestions, the National Association of Dental Examiners has also attempted certain so-called "reform movements," and the National Dental Association has been active in dental education. Be-

sides these three bodies, we find a fourth group composed of so-called "university schools," which seem to think they should be allowed to control dental education because of their university affiliations.

In addition to these above-named organizations, we also find that the medical profession has taken upon itself the privilege of suggesting what the education of the dentist should be, and how it should be carried out.

It would seem that these movements would be sufficient to regulate the needs of dental education, but we find another self-appointed group of individuals who do not belong to any of these organizations, who are attempting to control dental education, as a result of their self-appointed authority. These men have been attracted to the dental field because of the importance which it holds at the present time, and deem they are qualified to make suggestions because of their financial backing.

In asking the question again as to who is qualified to control dental education, it is well to analyze some of these movements. In the first place, the medical profession can be eliminated because they are not familiar with the needs of the dental profession, or the needs of the general public from a dental standpoint. The place which the dental profession has attained up to the present time has been the result of activities within the dental profession itself. The first dental school organized was formed because the medical schools would not recognize the demand for dental education. If the medical profession did not recognize the need of dental education in the past, and not having familiarized themselves with the conditions at the present, they certainly can be eliminated.

Therefore, we believe that any movements to regulate dental education should be made by men in the dental profession who are qualified to fill these positions. Because this is the opinion of many, the National Dental Educational Council was organized, which consists of men selected from the National Dental Association, the National Association of Dental Examiners and the National Faculty Association. It is our belief that the National Educational Council contains a group of men best suited to deal with dental education. We will admit they may make mistakes, probably have made mistakes, but they are certainly better qualified than any of the other group we have considered.

In regard to the Association of University Schools, or whatever they call themselves, they are composed of a few men who have been carried away along idealistic lines, which are not practical. If dental education is predominated by their desires, the dental profession will suffer and the public will suffer, because these men are not practical dentists. Their ideas rank high from an educational standpoint, but are not productive of the best results for the public.

In regard to the last group of men, namely, those of financial standing who have made suggestions regarding dental education, we believe they are absolutely unqualified, and we can see no reason why they should enter the dental field along educational lines, except that they have been attracted by the prominence which dentistry has attained at the present time, and are a

group of individuals who desire to be in control of everything that is of importance. One of these men who claims to represent a large financial organization has taken it upon himself to attempt to suggest reforms in dental education. These men have never been dental educators, and the only reason they have become interested in dentistry at the present time, is the growth of the profession during the last few years.

If dentistry has been able to make a name for itself that attracts these self-styled "educators," and as that name has been made through the efforts of the dental profession, we believe that the greatest good will be accomplished by leaving dental education in the hands of the dental profession.

We furthermore believe that the dental profession is best qualified to solve its own problems without the aid of men who are not familiar with them.

Lincoln Life Sketches*

"**L**INCOLN LIFE SKETCHES" is the title of a little volume in verse and prose. The book is unique in that it contains a good many poems each one of which describes some incident in the life of Lincoln. The occasion for writing the verse, historical reference, and so forth, is given in a series of prose notes, one for each poem. The book is very pleasingly arranged. The different incidents in the life of the man who endeared himself to all the people are taken up in order from his birth to his death.

The book is of special interest to the dental profession because it is the work of Dr. Garret Newkirk, who is loved and respected by the dental profession.

Besides being a pleasing book for the dentist, it is an excellent work for the reception room of any professional man. The author states that by sending direct to him at Pasadena, California, any member of the profession can obtain an autographed copy.

**Lincoln Life Sketches.* By Dr. Garret Newkirk, 1921, Duffield & Co. Price, \$1.25.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Société Française d'Orthopédie Dento-Faciale

On May 22d was founded the French Society for Dento-Facial Orthopedia, which, as its name implies, is devoted to the study and advancement of orthodontia.

Dentists living *outside* of France may be admitted as *Associate* members, provided they take an active interest in that specialty. Their admission may be obtained by submitting an application blank signed by two members of the Society; the application should be accompanied by the amount of fifty francs; the admission is definitive only after a formal vote of the Society.

Officers for the coming year are as follows:

President, Dr. J. T. Quintero, 1, Quai Jules Courmont, Lyon.

Vice-President, Dr. E. Gallavardin, 50, Rue de la République, Lyon.

Secretary, Dr. B. de Nevreze, 20, Rue de Mogador, Paris, 9.

Treasurer, Dr. E. Hollande, 6, Rue de Boigne, Chambéry, Savoie.

Editor, Dr. P. Ollagnier, 15, Place Hotel de Ville, Saint Etienne, Loire.

Next meeting will take place in Paris at Christmas time, 1921. All interested in orthodontia are cordially invited to communicate with Dr. B. de Nevreze, Secretary, at Paris, 9, No. 20, Rue de Mogador.

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ORIGINAL ARTICLES

PRESIDENT'S ADDRESS BEFORE THE PACIFIC COAST SOCIETY OF ORTHODONTISTS*

BY H. L. MOREHOUSE, D.D.S., SPOKANE, WASH.

THIS morning we have assembled for the Eighth Annual Meeting of the Pacific Coast Society of Orthodontists and I am going to ask you to join with me in making this a celebration of the 20th Anniversary of our beloved specialty, orthodontia, as a distinct specialty of dentistry. I think that I am correct in saying that it was the first branch of dentistry to take a definite stand as a specialty. According to records completed by Dr. Weinberger, the work of straightening the teeth as it used to be called, was practiced as far back as 1728, at which time we find an article by Dr. Fauchard on that subject.

I have not the time nor do I wish to bore you with a lot of history for most of you have read Dr. Weinberger's articles on the "History of Orthodontia." I would like, however, to have you bear with me while I hastily take you back over the past twenty years to the time and place where I feel orthodontia as a specialty was given birth. On June 11, 12 and 13, 1901, in the city of St. Louis, Missouri, the first Society of Orthodontists was brought into existence and christened "The Angle Society of Orthodontists." This took place the year after Dr. Edward H. Angle, the father of our specialty, had given his first course of instructions to a small class of nine or ten men, most of whom you will recognize as well-known men in the profession today. "Those present were Drs. Edward H. Angle, President; Milton Watson, Secretary; Frank Gough, Frederick C. Kemple, Lloyd S. Lowrie, T. B. Mercer, Grafton Monroe, Herbert A. Pullen, F. W. Rafter, and Richard Summa."

At the opening meeting, the president, Dr. Angle, made the following address:

*Read before the Pacific Coast Society of Orthodontists, Portland, Oregon, Feb. 16, 17, and 18, 1921.

"This morning marks another epoch in the history of Science, the opening of the first meeting of the Society of Orthodontia, a society organized for the promotion and exaltation of that branch of Dental Science known as Orthodontia, and looking to the early complete recognition of the branch as a distinct specialty, to be taught and practiced as such."

Continuing he stated, "Doubtless it would not be inappropriate for me at this time, to set forth the reasons for the organization of such a society, for unless there be good and valid reasons for its establishment, its course must be marked by an unhealthy and unprofitable existence and probably an early dissolution. On the other hand, if there be good and sufficient reasons for such a society, they should be known and recognized by the lovers of all branches of medical science and the sympathy and assistance of all enlisted, that the greatest degree of benefit may be conferred, not only to the science of orthodontia, but to humanity at large, to whose welfare all laws enacted and all societies organized owe their first duties. Hence, I shall endeavor to set forth some reasons why this organization should be founded and why I believe this meeting marks the beginning of something so grand, so noble, something destined to so elevate dentistry in general and so greatly benefit humanity, that even we who are assembled here this morning dare not yet dream of its importance, though we, as founders, are most interested and our hearts beat highest in enthusiasm, anxiety, and love for this branch of science and the success of this, the first meeting."

The past twenty years has proved that there was a good and sufficient reason for the birth of this specialty. Those of us who were among the pioneers can feel especially proud as well as all of you who are now enjoying this interesting work. I will use Dr. Angle's answer to why orthodontia should be a science and a specialty as the reason for the establishment at that time of orthodontia as a specialty and we should be enthused and stimulated to greater endeavors as we celebrate this 20th anniversary of one of the greatest specialties of medical science.

Dr. Angle states: "It is a great science by itself, with requirements in its study and practice so radically unlike that of the other branches of dentistry that the two can never be profitably combined, either in study or practice. Each seriously handicaps the other and orthodontia naturally suffers most for the reason that it is wholly unlike other operations in dentistry. It is secondary alike in dental colleges, in practice and in dental societies. Hence it is not unlikely to follow that in proportion as a dentist is successful in other operations of dentistry, he will naturally be less successful in those of orthodontia, for in that same proportion he will have less inclination, less time, and less energy to devote to it. Few would think it advisable to combine the practice of rhinology with that of dentistry, and yet we believe the two could be far more easily, profitably and successfully combined than can orthodontia and dentistry proper. The fact is, orthodontia deals almost wholly with different tissues, principles and art problems from those treated in ordinary dentistry and is extremely exacting in its requirements, necessitating peculiar

talent, energy, fitness and devotion to certain lines of study which are the instruments best adapted to the performance of operations in each."

"The ultimate separation of orthodontia from dentistry proper is natural and inevitable and the sooner it is encouraged and becomes firmly established, the better it will be for both and infinitely better for humanity at large. As yet there have only been a few who have had the courage to completely specialize in the practice of orthodontia, but the results of the efforts of even those few has been truly remarkable. Orthodontia has been revolutionized, and we would ask those who may doubt the practicability of this specialization, not to mention the growth of nearly every other branch of science and art accomplished by the same power. Indeed this is the very age of specialization, and was there ever such an age of progress? Wise is he who recognizes the natural and resistless power of specialization, and narrow indeed must he be who is blind to its demands and attempts to resist its might.

"To hope that all this may be brought about at once, or even in several years, would be expecting too much. Great and radical changes must be wrought slowly.

"So we must work patiently and wait and believe that orthodontia, so replete with possibilities for improving the health and happiness of orally deformed humanity and for uplifting the highest phase of art, or that of improving the lines of beauty of the living, divinely patterned human face, will and must be a firmly established and useful specialty of dental science, and if this is inevitable, as I believe it is, then it is fitting and proper that this society should be established, for our best efforts can only yield the best fruit in strong, earnest, sincere, concerted action."

Continuing, Dr. Angle says: "Let me earnestly try to impress upon you that in proportion as we are sincere, broad, liberal, honest, earnest and studious, will our efforts be successful and the prosperity of this science specialty be insured.

"We must keep in mind, notwithstanding the fact that orthodontia has recently made marvelous advancement, almost revolutionizing itself in the past two or three years, that there are yet many points on which much careful painstaking and methodical investigation is needed." How well these words still apply today.

During these twenty years we have seen this science advance step by step under the guiding hand of many earnest, conscientious workers who had its welfare at heart. Mechanical devices have been improved until they are simple but direct in their action. Best of all with the usual foresightedness, our profession has gone beyond the mechanical phase and developed principles by which we can get Nature to not only better assist in the development, but give more assurance of the stability of our finished cases. Among these might be mentioned the work done on the "Training and Strengthening of the Muscles of Mastication and Expression" by Dr. Alfred P. Rogers; "The Physiological Changes in the Bony and Fibrous Tissues of the Jaw" by Frederick Noyes; then for further encouragement we can look back on the programs of this Society since it started and we find the following subjects which

have been given serious consideration on our programs: "Relation of the Physician to the Orthodontist"; "Relation of the Rhinologist to the Orthodontist"; "Nutrition of the Child"; "Arrested Vertical Development"; "Impacted Third Molar Influence in Orthodontia Treatment"; and "The Psychology in Handling Children"; we can feel proud that the prophecy was not in vain.

When we read those words of Dr. Angle's spoken a decade ago, we realize with what wisdom and foresight our specialty was conceived. It is befitting, therefore, in celebrating this anniversary that we do homage to those pioneers who have made so much possible and especially to Dr. Edward H. Angle, the father of orthodontia.

There is one point that I feel that we, as orthodontists, should continue to keep before us for the future good of our chosen work, that of conscientious following up of our cases, not one or two years, but five years. Even that will not be enough if we have not satisfied ourselves that there are not some forces which we have overlooked which might throw out of harmony the beautiful effect that we have accomplished. These forces might be untrained muscles or impacted third molars.

If any of you are in doubt about either, especially the latter, look up some of your cases that have been dismissed from your mind three or four years ago in which these forces have not been reckoned with and see how many of them bring pleasure to your soul in renewing old acquaintances.

I want to urge upon the members of this society, the great necessity of giving real service. In our specialty, the final result is what we are building our reputation on and what our patients are paying for and we must be conscientious that in so far as it lies within our human efforts, the normal should be the goal.

The question of service is becoming the paramount consideration today in all walks of life. The following quotation from President Warren G. Harding will bear me out. Mr. Harding emphasized in a recent speech the need for recognition by all men that if conditions are to be bettered, "Service must be the prime object in every commercial activity and then profit will follow service 'as night the day.'"

In closing I want to wish orthodontia many more decades of usefulness and express my faith that this Society will always be in the front ranks of this advance.

DISCUSSION

Dr. Charles C. Mann.—I would like to felicitate the president on the beautiful address he has presented to us this morning. His reference to Dr. Angle and the work done by him in furthering orthodontia is especially apt, and I think as we grow older in this work our appreciation of Dr. Angle's work for orthodontia, not only in the beginning, but his continued activity, even into his riper years is a thing we will appreciate more and more each day. I personally feel that the science of orthodontia has and is opening broader and greater fields, presenting more opportunities for real service, real work, than it has in the years gone by, and I think that your remarks, Mr. President, encouraging real, honest, conscientious service should be taken by the members of this Society at their full value.

Dr. Allen E. Scott, San Francisco, Calif.—I wish to express my very deep appreciation for this address, and say that I have enjoyed it very much. I have been a great admirer of Dr. Angle ever since I took up this work, and I think we owe a great deal of what we have today to his efforts. One of the greatest things with which I have been impressed as the outgrowth of his work is the great enthusiasm and great encouragement he gave his disciples, we might say—those who trained under him for this work. Some of the principles which Dr. Angle advocated may have since been proved wrong, but the fact remains, he was the great pioneer in this work, and to him we owe very much of what we have found out since his activity commenced. As to the practice of this work as a specialty, I want to agree with the president heartily, and sincerely, as I think the man who tries to do orthodontics with general dentistry soon gets into serious trouble. A great many times, students at the University of California ask about taking up orthodontia as a specialty. They say we will do it two days a week, and general dentistry the remainder of the week. But the dentist soon finds out the orthodontic appliances break, and require immediate attention. His dental patients come in on the days he is devoting to the special work and it breaks into this work in that way. Likewise, the orthodontia patients come in on the days devoted to his general practice, and it is hard to concentrate on either one. So, it is usually my advice to students to take a good course with some recognized man and start out to do this work as a specialty. There is usually plenty of it to do, and if they go at it with the proper desire, there is no trouble to get plenty to keep them busy almost from the start.

I came up here a considerable distance, although it is no further from San Francisco to Portland, than from Portland to San Francisco. I tried to get some of the other men to come, but was not very successful. I have indeed been well repaid for the journey. You people up here have been very kind in coming down to San Francisco from year to year. I wish the men from the South might have made a little better showing at this splendid meeting.

Dr. H. F. Sturdevant, Portland, Oregon.—Our president is a strong Rotarian. Service and not self is a motto of the Rotary Club. Service is an important thing in orthodontia, as he mentioned, because so many of our cases have to be carried over a period of a year or two, possibly in addition to the time originally estimated, and the necessity of watching our cases for the longer period, noting the impacted third molar, the muscular training of the patient, etc., is all vital to our work. So service is expected from the parent, as well as from the orthodontist. Cooperation is what is needed. Another thing: we do not get in close enough touch with the rhinologist. I do not believe one rhinologist in a dozen realizes the importance of the occlusion of the teeth with regard to the development of the nasal cavity, or the relation between the development of the jaws and the nasal cavity. If the orthodontist could more often get before the rhinological societies with slides and case reports, it would be a great boon to rhinology, as well as a help to orthodontia.

Dr. C. O. Engstrom, Sacramento, Calif.—I do not wish to let this opportunity go by without some statement in regard to this society, which is an important factor in the development of orthodontia. It may truly be said there is no East or West, no North or South in orthodontia today. The individual efforts of our members in the advancement of orthodontia are shown in this society. If you will compare the program which we have today, with the programs given in the East I am sure you will bear me out that our program represents as high a standing as any. It must be considered, too, that we are a small Society. Orthodontia had its beginning in the East, and most of the leaders have been of the East, but, considering the individual orthodontist I think that the orthodontists of the Pacific Coast stand equally well with those of the Atlantic Coast, and this Society unquestionably is bearing out and fulfilling those precepts advanced by Dr. Angle at the first meeting of an Orthodontia Society in this country.

Dr. Charles C. Mann, Seattle, Wash.—I wish to speak in respect to combining the practice of orthodontia with dentistry. In the smaller towns there is a need for orthodontic service. There is not enough work for a man to devote all of his time to that particular

line. It has always been my practice to encourage men willing to study and fit themselves properly by recognized courses to carry on work in the smaller towns. Speaking with reference to Dr. Wentworth of Everett, I have encouraged him to carry on the work in his town, which is some thirty-eight miles from Seattle. I feel in the larger towns the men could well benefit by cutting loose from general practice and entering the specialty, but I do feel that there is a field for combining this work with dentistry in the smaller cities, where men are willing to go away and fit themselves by the proper course of study. I think they should be encouraged to do as much good work as they can, and they are certainly benefiting their patients.

Dr. William Cavanagh, Portland, Oregon.—I wish to express my appreciation for the thoughts in the president's address on this anniversary. There is one excuse for a man embodying some dentistry with orthodontia, and that is the inability to get the dental restorations made according to the orthodontist's idea after he has completed his work. It is almost next to impossible to get the restorations we need. We will observe, however, that the brightest men in general dentistry in every city are eliminating orthodontia from their practice. Those we respect most in general practice, and those who put to it the most study are not practicing orthodontia. They are wise enough to know that it is a work in itself. I wish to express again the thing that comes to me as indicating the greatest progress we are going to make in the future. We have arrived at a point where, with the mechanical appliances we have, we can accomplish any desired result in the movement of teeth. I think it is generally conceded, we can put a tooth any place we desire in the mouth with the appliances at our command. We have gone far enough in the matter of appliances. Progress in the future must come from the more intimate knowledge of the histologic character of the tissues involved in the movement of teeth, more knowledge of the elements that are necessary in order to stabilize our results after we have obtained them. Nothing is more sickening, as the president says, than in noting the conditions in some of our patients five or six years after the completion of our work. The pathologic position of the third molar does not explain it all. The inheritance of constitutional deficiency possibly prevents getting the results of which we are most proud. I think we must have a better understanding of the tissues on which we are at work, and a closer cooperation with the medical profession in building up our patients, so that our work will be permanent. I think all the progress we make from now on must come from the better understanding of glandular deficiencies, such as was touched on last night by Dr. Walter G. Hein of New York. We doubtless need some means whereby we can build up the patient generally. We cannot take an abnormal child and expect to make those jaws normal while the child is abnormal in many other respects. It will take a better understanding of general medicine and cooperation with the physician, I believe.

Dr. J. A. Rawling, Tacoma, Washington.—I did not care to throw a monkey wrench into the unanimity of this meeting. I have been doing considerable orthodontia and still do some general dentistry. I try not to let my general practice interfere with my orthodontia, however.

Dr. George W. Wentworth, Everett, Washington.—I would not offer an apology for combining general dentistry with orthodontia. I am willing to stand on my own feet, and do what I think is best for the people in the community in which I reside. Everybody cannot live in Portland, Seattle, San Francisco, Spokane or Tacoma, and if the patients cannot get the services of specialists, men who are combining general dentistry and orthodontia will have to render orthodontic service as best they can. That happens to be my lot in Everett. Some day I hope to be able to limit my practice to orthodontia, but am not willing to move into a larger community to do so.

With reference to the remarks made as to the cooperation of the rhinologist with the orthodontists, we have taken a step in Everett along that line. The County Medical Society invited me, to present for their last meeting, whatever I could regarding the normal and abnormal conditions of the teeth in regard to the health of the child. It was a step toward the cooperation of the orthodontist and the medical man, and I am sure some good will come from such a movement as things progress.

I want to thank my friends, Dr. Charles C. Mann, and Dr. William B. Power for making it possible, and urging me to attend this meeting. I need the stimulus which comes from rubbing elbows with those who are better informed along this particular line of work.

Dr. Morehouse, (closing discussion).—As to men in general practice doing orthodontia, there may be exceptions to all rules, of course. As specialists we see certain phases of it. Every man must be guided according to conditions existing in his own home town. The main thing is that we shall not overlook the final goal, which I have found too often occurs with those cases treated in general practice. We want to have these gentlemen with us and I hope in the near future they will be one of us.

ORTHODONTIC TREATMENT OF THE TEMPORARY ARCHES*

BY E. A. BOGUE, D.D.S., M.D., NEW YORK CITY

I HAVE been requested to give a little history of the case the models of which I will show.

The boy came to me at about six years of age; extremely deaf; the width of the maxillary dental arch was 27 millimeters. No other noticeable irregularity. Fig. 1—A is a portrait, full face. (Portraits taken May 16, 1916.) Fig. 1—B is a portrait, right side. Fig. 1—C is a portrait, left side. Fig. 2—A shows original models, *open*. Fig. 2—B shows original models, *closed*.

Fig. 1-A.—Full face portrait of patient before treatment.

Fig. 1-B.—Right side portrait of patient before treatment.

Fig. 1-C.—Left side portrait of patient before treatment.

Apparatus to spread the temporary grinding teeth laterally and the incisors and canines anteriorly was placed upon these teeth.

The expectation was that in moving the temporary molars laterally at so early an age the crowns of the premolars, which at that time are embraced by the roots of the temporary molars, might be carried with them, though, at that age, the palatal root of the upper temporary molar is partly absorbed.

*Read before the Alumni Society of the Dewey School of Orthodontia, Atlantic City, April 25-26, 1921.

By this pressure, the growth of the alveolus and the adjoining facial bones was stimulated to such an extent as to obtain for this boy what I look upon as a normal arch of temporary teeth, which would measure 35 millimeters across the second temporary molar region.

The rarity of normal arches of temporary teeth may be inferred from the examinations made of school children in the various northern cities of this country, where the reports give from 70 to 96 per cent of these children as being subnormal.

Subnormal means almost invariably too small arches, and arises, I think, from an arrest in the development of the child during the formation and eruption of the temporary teeth, and not from the various accidents that are gen-

Fig. 2-A — Models before treatment. Open.

Fig. 2-B.—Closed models before treatment.

erally spoken of, such as the use of the "pacifier," the premature extraction of the temporary teeth, or leaving them in too long, or dental decay; all of which may have an influence towards irregularity but are not the prime cause of it.

The growth of this boy was arrested at another point, viz., the eustachian tubes, which were so curved as to partially close their orifices, making it difficult for him to hear enough to be properly placed in the chair.

The position of the permanent teeth in this case in relation to the temporary teeth, is well shown by the schematic diagram (Fig. 4).

My task was to do the greatest amount of good in the easiest possible manner, moving those teeth that required movement, and touching nothing with which it was not necessary to interfere.

My apparatus was placed exclusively upon the temporary teeth. In three or four months the spreading and growth was such that the curvature and partial stoppage of the eustachian tubes was so far corrected that from that time onward the boy's hearing continued to improve until now it is entirely normal.

At this stage, I made a hard rubber obturator for him, fitting the outsides of the closed front teeth and lying between the teeth and the lips when in place. For a short time adhesive strips were used on the lips to confine the obturator in place during sleep.

While this obturator is in place, the lips are becoming habituated to the closed position and mouth breathing is impossible.

The occlusion of the deciduous grinding teeth became such that the boy learned to masticate much more thoroughly than before, the air passages be-

Fig. 3.—Spreading apparatus for deciduous teeth.

Fig. 4.—Relation of permanent crowns to deciduous roots before treatment.

tween the nose and lungs were broadened and the mouth which had been disagreeably open day and night when he came, closed and remained closed during sleep. Snoring ceased. The chest cavity enlarged to such an extent that even the heart began to operate more freely and the boy to grow.

In this instance none of the products of the ductless glands was used, and aside from such change in his diet as brought bran muffins, salads, fresh vegetables and the skins of baked potatoes, no medication, nor further change was necessary.

The regulating apparatus used was the Ainsworth pattern, which moves teeth without tipping them.

The wire arches were made of gold and platinum 18-gauge wire.

When the necessary spreading had been accomplished, the same appa-

tus was left in place until the temporary teeth, to which it was attached, began to loosen, when they were removed or came out together with the apparatus.

The occlusion at this stage is so good that the five or six permanent teeth that are not yet fully erupted will come to their respective places without further assistance.

The wire arches were held to their place by what we call "ear-ring loops,"

Fig 5.—Hard rubber obturator to overcome mouth breathing after spreading the dental arches.

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Fig 6.—A predetermined arch of a defective case.

made of fine ligature wire, 28-gauge, passed through holes drilled in the ends of the wire expansion arches which had been placed in the vertical tubes attached to the molar bands.

The question now arises, how to determine the size of the arch to which I undertook to draw the temporary teeth?

I took the models of five nearly normal cases which I possess, and estimating that the permanent maxillary incisors are $1/5$ larger than the temporary maxillary incisors, drew an arch after the Hawley Bonwill method of triangu-

lation which I found accorded very accurately with the sizes of these five nearly normal cases.

Fig. 6 shows that I could safely bring that temporary arch, which at the time the patient came into my hands was only 27 mm. broad at the 2nd temporary molar region, out to 35 mm. broad, and that this breadth and size of arch would allow the permanent teeth to come of themselves to their proper places in the arch of permanent teeth.

Taking the models of the temporary teeth (Fig. 7) from the first impressions I procured, I cut the maxillary model into three pieces, and spread

Fig. 7.—A process in construction of regulating spreader.

Fig. 8. —Large cavity of decay formed through defect in the enamel coating of the tooth.

the molar pieces until the 2nd molars were 35 mm. apart, while the incisors were advanced anteriorly according to the Hawley arch. These three pieces being attached to a bit of glass with melted wax were carefully articulated to the mandibular model, also cut into three pieces, which gave me the occlusion of these temporary teeth as they ought to have been had the patient been a normal child.

To these models I adapted bands and palatal wires above against the three teeth on either side; bands and finger springs below, which moved the

entire row of mandibular teeth including incisors; the regulating wire arches of 18- to 20-gauge gold and platinum wire, each of them having a double loop at each end so that the loop being drawn together when the arch was first placed could be adapted to the small arch as we began, and spread apart as we progressed until we required a second arch, which should be made at the

Fig. 9-A.--Open plaster models after correction by spreading deciduous arches.

Fig. 9-B --Finished model closed

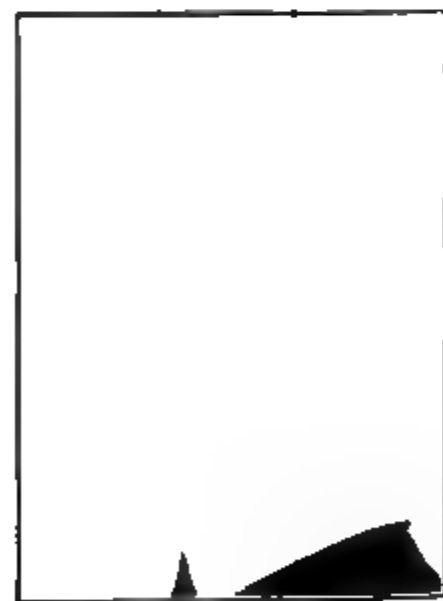


Fig. 10-A.—Full face portrait after treatment. (Ten years old.)

Fig. 10-B.—Portrait after treatment. Right side profile. (Ten years old.)

Fig. 10-C.—Portrait after treatment. Left side profile. (Ten years old.)

time of beginning, and which in almost every case can be kept in place until the operation is complete.

During the progress of this operation I saw to it very accurately that all the defects that I could discover in the temporary teeth had fillings in-

sented, as I know all too well what supervenes in cases where arrested development of the enamel of teeth is neglected (Fig. 8).

When I finally dismissed this boy, the four permanent molar teeth were almost entirely erupted, they each had three or four gold and tin fillings inserted into what were crevices caused by defective formation.

But at ten years of age, I had the satisfaction of finding that there were no cavities that required fillings in any of the permanent teeth. The boy has learned to masticate thoroughly and to thoroughly cleanse his teeth. I think he is in pretty good condition to avoid all dentistry that need be dreaded for the rest of his life. If he is regularly examined and cared for, he will in the future never have a large or painful cavity.

Fig. 9-A shows the finished model open.

Fig. 9-B shows the finished model closed.

Fig. 10-A is a full face portrait.

Fig. 10-B is a portrait of the right side.

Fig. 10-C is a portrait of the left side.

DISCUSSION

Doctor George F. Burke, Detroit, Michigan.—Relative to the use of the rubber mouth piece as shown to you by Dr. Bogue, I would like to ask would not its use during sleep act as a retainer worn by children who were under treatment for distoclusion cases?

Dr. Bogue.—You mean as a retainer of the teeth in position?

Dr. Burke.—Yes.

Dr. Bogue.—No, sir. It would have nothing whatever to do with that.

Doctor Burke.—Inasfar as its use means pressure from both upper and lower alike, extended through this piece on to labial surfaces of incisors, this method is well worth knowing about.

Dr. Bogue.—The question that has been asked brings up so many queer things that I confess I was a heretic before I did myself the honor of accepting your kind invitation. I believe myself that if a set of irregular teeth were actually brought to a normal position, anything that did not disturb the position of those teeth after you brought them there, would be a help because it would force breathing through the proper nasal passages, the posterior naris, and so on. By the time the teeth have been brought into their proper position (and there is a chance for me to be wrong) I estimate that the whole face, nose and various antra, and if taken early enough, the skull and thorax as well will be enlarged to such a degree that there is very little chance of the patient going back.

Dr. Frank A. Delabarre, Boston, Mass.—I am sorry, Mr. President, to wait for you to call upon me because I fully intended to speak on this subject, not as a champion of Dr. Bogue and his followers, but as a devout apostle. I have known Dr. Bogue for many years; I went to college with his son, and I have followed Bogue's work very carefully. He has led me by the hand, and he is the man responsible for my own adoption of that principle of orthodontic prevention which is concerning us all very deeply at present, and I look to Dr. Bogue as the first and most powerful advocate of preventive treatment in orthodontia. The results that he has obtained in his own office are perfectly astounding, and today he has simply let fall one drop of his knowledge to be absorbed by you.

I will also speak of the Ainsworth appliance he sometimes uses. I was with Ainsworth for five years when I started my practice, and I saw the development of this appliance that Ainsworth has given to us, and I have used it since as being peculiarly adapted to the treatment of these very young children and yielding the most beautiful results.

Dr. Bogue is not so tied up in the mechanics of orthodontia that he places undue emphasis on the mechanical phase of the subject, and if you sound him deep enough you will find in him a very deep appreciation of the benefits to be given to the individual patients which are not purely physical in the rearrangement of their teeth, but benefits which are reflected all through the physical body as well as the mental development. If you are going to make your mark in the world as Bogue has made his, you must cease to look upon orthodontia as a purely mechanical problem, and you must apply to it in practice and in study the other phases of the question which have to do with the development of the entire organism of the children on whom you are working.

I want to thank Dr. Bogue for his paper, and I wish to commend him to the younger men who have only started in orthodontia as a man whom it is safe to follow, and with whose doctrines they should become thoroughly familiar.

Dr. Sidney W. Bradley, Ottawa, Canada.—After you have expanded those deciduous arches, have you an approximate idea as to the percentage in which the premolars and permanent canines erupt normally? Do you follow the case right through until the child is ten or twelve years of age?

Dr. Bogue.—I have never thought of it in that way. Space is always made for the teeth to erupt normally; whether they do depends upon the physical development of the child. Yes, if you keep the friendship of your patients. That allows me to answer you in a roundabout way. I speak from memory, so I may be mistaken in my dates, but I think in 1905 there came to me two little sisters, one five years of age, and the other somewhat older. In 1910 the younger one being very ill was taken to Boston and put into the hands of a fellow practitioner there. The older one stayed with me another year or more, and then their father died, and I lost sight of the members of that family. I did not see these young girls for seven or eight years—may be longer. I went to a theater one night and sat in the back seat and my assistant nudged me and said, "Have you noticed how distinctly Miss ——— articulates?" "Yes," I replied, "I noticed how distinctly she spoke, and I patted myself on the back, if you please." The next day the mother of this young lady walked into my office with a large photograph of her daughter. On the face of it was written this message. "To Dr. Bogue, who is responsible for every success I have had or may have in the future." I had not seen that girl for seven or eight years, that message took me off my feet. Patients are not generally so grateful as that—at least, I have not found them so.

In November, that girl came into my office. I looked at her and said, "My dear, I am grateful beyond my powers to express for what you wrote me, but you do not speak distinctly enough for an actress. You have a lisp." She said, "I know that, but by taking a little pains I can correct that." A few days later her mother came in and said, "Is there anything that you can do to correct that lisp and make things a little better than they are." I replied, "I do not know." I did not dare answer or try to answer definitely. She said, "If there is anything you possibly can do to make things any better, find it out if you can, and tell it to me."

Our work, gentlemen, lies along these lines, and it lies more deeply than most of us know, and there are triumphs to be won of which we know very little.

If we begin early enough in these cases we can accomplish a great deal for them. I have made a good many experiments along these lines to see what can be done and have started to see if I could not regain something I had lost. I made models and charts. I know what I have done. I know what we have reached at a certain stage, and I know what we did in 1910 and in 1912. I know the main difficulties, and my greatest regret was that I did not treat that child before the age at which she was treated. The most rapid growth of the brain takes place before six years of age, if the brain box is not there to take it, what will happen to the brain? If I am not prepared for that and am not planning for the brain to go into a box of sufficient size, this part of the individual should be correspondingly enlarged. Growth will take place right along, and if mechanical spreading cannot do it, let other means do it, and then comes in what Dr. Percy Howe is doing at the Forsyth Institute, namely, finding that our food has much to do with it. I have found it so.

I have a number of patients now who are taking thyroid extract, pituitary extract, adrenalin, etc., and they are growing as they never did before, and as they grow, all these surrounding parts grow, and I want to accomplish my corrective work before the period at which this extraordinary growth ceases.

The treatment of these cases must be undertaken early if we would accomplish the best results.

Dr. Victor Hugo Jackson, New York City.—I am pleased with what Dr. Bogue has presented.

The doctor has called attention to several important features that should be remembered. Among them are the early regulation of the teeth and, the long retention of the teeth after such regulation. These are important factors in the work of the orthodontist.

The treatment for the regulation of the teeth should be taken up early in life before the bone becomes dense. In my opinion, this treatment is equally, or even more necessary than the early orthopedic treatment of general deformities of the bones of the limbs with which we are familiar.

Analogy.—A tender shoot of a sapling, while in its pithy state, is planted in a yard for decoration. With proper care this or any plant can be readily grown into almost any desired shape and, while in this state, its defects corrected by reshaping it, and then supporting it until there is sufficient woody growth to sustain it. For this reshaping the horticulturist would not wait until the sapling had become a tree of any size, as of three or six inches in diameter, before trying to improve its form.

We have been neglecting the child and, even though we knew it had a defective bony frame, amounting to a deformity, through lack of understanding we have not thought of interfering with it until the development had advanced and shown a marked deformity and, even then, we have been inclined to wait until the defect had become a confirmed deformity, vainly hoping all this time, that Nature would be able through further development to correct this condition.

In discussion at an International Congress, Dr. Bogue spoke for the welfare of the child and of the serious situation arising from the extraction of the deciduous or permanent teeth. Some one has to teach the profession and the public what can be done to protect the child against such a condition and no one has striven more in this work than Dr. Bogue. He has presented most helpful thoughts in teaching the humanitarian side of dentistry and has advised dentists of their duties to their patients.

He has dealt with the practical side of this subject and we should pay close attention to his statements. I am glad to render him my tribute of praise.

Dr. John A. McPhail, Cincinnati, Ohio.—I would like to ask Dr. Bogue if the wearing of the vulcanite obturator he has shown will help development and lengthen the undeveloped upper lip which we usually associate with posterior occlusion cases?

Dr. Bogue.—Yes, sir.

Dr. Irving Spenadel, New York, N. Y.—I have been interested in growth and development, especially with reference to the treatment of patients with medical therapy, conditions such as hyper- and hypothyroidism, pituitary, and renal.

Following Drs. Pryor and Rotch, I am examining children who come to me and present a history of some severe systemic disturbance they have undergone, which apparently has left some mark on the osseous structure of that child and retarded its growth.

I x-ray the hands of the child to determine the anatomic age as compared to its chronologic age, by a careful reading of the epiphyseal cartilages and also the position, size and shape of the carpal bones. If the x-ray shows that the epiphyses have not joined at a certain stage in the child's development; if it shows any deformity in the size and shape of the bones, or any process other than normal for a certain chronologic age, I send that individual to an internist who is better able to study the symptoms as they arise and vary from time to time, than we who have had no special training along these lines.

I have not been as successful as Dr. Bogue with this form of treatment. I have been getting patients at an age when comparatively little can be done to make any material

change both in their physical and mental conditions. Patients tire by the length of treatment they must undergo over a period of years which in many cases is prolonged throughout that individual's life.

I have had some results with a girl fourteen and a half years of age, anemic, x-ray showing large opening of the epiphysis which normally should be closed at that age. She was diagnosed as a case of dispituitarism. After eight months of treatment the girl gained in weight, height, and x-ray showed a slight closing of the cartilages.

I recall another case of great interest to me. A boy of sixteen, five foot six, weighing one hundred pounds, presenting a distoclusion with a marked open bite. This boy was treated by a general practitioner for four years with no apparent result. He gave a history as being the fifteenth child in a family of seventeen children, where all the girls are robust and strong, and the boys, who were born later, developed poorly both mentally and physically. An x-ray picture of the hand showed a poorly developed bone with a very wide opening of the epiphysis. An x-ray of the head revealed a poorly formed sella tursica. The boy is under treatment by an internist. His nocturnal bed wettings have ceased. If, however, his epiphyses remain open after treatment, in all probabilities his orthodontic treatment will be unsatisfactory.

I would like to know whether Dr. Rague has had similar experiences with thyroid or pituitary treatment.

Dr. Edward A. Bogue, New York City.—A young lady of seventeen was brought to me by her father, who was a physician, at the instance of a great friend of the father, who was also a physician. This young lady was examined and it was found that her epiphyses were fully formed, and I discouraged the father from making any effort to do anything with the glandular extracts. She continued to come to me for several years, but once having been put right she stayed right. She takes care of herself as well as she can. I have not meddled with the food, believing it would not be right on my part when her father is a physician, but I declined to treat the girl any more.

Dr. Spenadel.—Do we get a closing up of the epiphyses?

Dr. Bogue.—You may remember that the Vienna surgeon (Dr. Lorenz), who was called to this country to attend the Armour child in Chicago did not treat a dislocated hip after five years of age. He simply declined it. I have declined to treat a good many cases.

Dr. Spenadel.—We can trace many of our failures to this process of finding out the real anatomic age, and where there will not be any material gain in closing the epiphyses it is best to let these cases alone. Don't you think so?

Dr. Bogue.—I am sorry not to be able to make distinct and clear all I say or try to say, but I do not know enough about the subject to say anything along these lines.

I wish to thank you for the kind invitation and the marked attention with which you have listened to me, and I hope some of my professional brethren may meet with a change of heart equal to what was told me last Monday by a gentleman whose name I cannot recall at this moment. I met him at a dinner and I said to him, "I believe you and one or two others are going to wipe up the floor with me about my heresies." They thought I was entirely wrong about a year ago. "Yes," he replied, "I will take that all back. I think you are right, and I shall begin to treat my patients as early as I can."

Dr. Guy S. Corley, Mattoon, Illinois.—You published a series of articles I believe in the *Dental Digest*. Do you recall the year in which those articles appeared?

Dr. Bogue.—They were published in the *Dental Digest* in 1912 and 1913.

EXTENSIVE LOSS OF SUBSTANCE OF MANDIBLE DUE TO REMOVAL OF SARCOMA; REPLACED BY BONE GRAFT FROM CREST OF ILIUM*

BY ROBERT H. IVY, M.D., D.D.S., PHILADELPHIA, PA.

E. H. B., MALE, age twenty-seven, mechanical engineer, gives the following history: When seven years of age had a large section of the left side of the mandible removed, comprising the full thickness of the bone, by Dr. S. C. Dayan of Syracuse, N. Y., who diagnosed the case as sarcoma. He then came under the care of Dr. H. A. Pullen, of Buffalo, who constructed a prosthetic piece which partially overcame the deformity and enabled him to masticate food fairly well. Of late years, however, changes in the shape of the jaw and in the position of the teeth have affected the fit of the appliance, and it became a

Fig. 1—Full-face view showing flattening of left side

Fig. 2—Side view showing concavity due to absence of bone.

matter of necessity to seek further aid. Having moved to Philadelphia, he was asked by Dr. Pullen to consult Dr. John V. Mershon, who in turn referred him to me. Examination in March, 1920, revealed an absence of something over two inches of the left side of the mandible from the canine region to the angle. A small portion of the ascending ramus with coronoid and condyloid processes was present, this fragment being movable at the joint and drawn upward and inward by the action of the temporal and internal pterygoid muscles (Fig. 6). The remainder of the mandible showed great instability and a marked tendency to swing over to the left side, with consequent loss of facial balance and interference with function. The mandibular posterior teeth on the right side came

*Case reported before the American Society of Orthodontists, Atlantic City, N. J., April 28, 1921.

into occlusion with the mouth closed, but there was a considerable gap between the maxillary and mandibular anterior teeth (Fig. 3). Externally, there was a marked concavity on the left side due to absence of bone (Figs. 1 and 2). The objects of the treatment suggested in this case, were primarily the restoration of the continuity of the mandible to correct length of the bone as far as possible, improvement of the external appearance, and provision of a firm basis for support of an artificial denture to replace the missing teeth. The success attending bone grafting in cases of ununited gunshot fracture of the mandible during the recent war, led me to attempt a bone transplant in this case. Our experiences showed that probably the best results in analogous large losses of substance due to gunshot wound were obtained by employing a portion of the crest of the ilium for the graft. This portion of the skeleton furnishes a large, thick piece of bone, of porous structure closely allied to that of the mandible, and easily penetrated by new vascular supply. It can be used for losses of substance of almost any size, can be readily cut to suitable shape, has considerable inherent rigidity, and is of sufficient bulk to fill out large depressions giving rise to external deformity.

Fig. 3—Showing interval between upper and lower anterior teeth.

The disability produced by removal of the graft is quite temporary, and the danger negligible.

Before performing the operation on this patient, it was necessary to provide some means of fixation of the right side of the mandible in its proper relation to the upper jaw. This part of the work was performed by Dr. James E. Aiguier. Impressions of the maxillary and mandibular teeth were made, and the casts arranged on an articulator with the maxillary and mandibular teeth in as near the correct occlusion as possible. Splints were cast in coin silver in two sections, one for the maxillary and one for the mandibular teeth. To the buccal side of the right molar teeth on each section, there was soldered a piece of square silver tubing, the sections of tubing being so arranged that when the two portions of the splint were brought into occlusion they could be locked together by means of a pin fitting into the tubing (Fig. 4). An attempt was made to press the small ramus fragment on the left side downward and backward into position by means of a metal saddle, lined with velum rubber, covering the

mucous membrane overlying this fragment and attached to the upper portion of the splint by means of a threaded wire and nut (Fig. 5). The saddle, however, produced so much irritation to the soft tissues that it could not be tolerated by the patient, and had to be discarded, and we had to be content with fixation of the large fragment in its proper occlusal relationship. The splints were cemented in place. On March 17, 1920, at St. Agnes' Hospital, an incision was made in the left submaxillary region, a skin flap turned upward, and the ends of the fragments of the mandible exposed by dissection of the deeper tissues. The

Fig. 4.—Right side of splint showing lock-pin.

Fig. 5 —Left side of splint showing saddle for control of ramus.

overlying periosteum was stripped back for about half an inch and the ends of the bone freshened with bone cutting forceps. A hole was drilled in each fragment. Hemorrhage was controlled as far as possible by clamping vessels and by gauze pressure. An incision was made through the skin over the crest of the left ilium, beginning at the anterior superior spine, and carried back for about three inches along the top of the ridge down to the bone. The muscles arising from the inner and outer lips were detached with the knife and periosteal elevator. With a metacarpal saw, beginning at and including the anterior

Fig. 6.—Radiogram showing defect in mandible.

Fig. 7. Radiogram six months after operation showing that graft in position

superior spine, a piece of the entire width of the crest was removed, two and one-half inches long, the required length being determined by measuring the mandibular gap. The detached muscles were now brought over the top of the

ilium and sutured together with chromic catgut. The skin incision was closed without drainage. The graft, handled only with forceps, was now drilled at each end, placed between the mandibular fragments, and fixed to them by means of silver wires passed through the holes in the graft and in the ends of the fragments. The deep tissues and skin were sutured over the graft and fragments in two separate layers. A rubber drain was inserted under the skin for twenty-four hours to carry away any oozing blood. A few days later, considerable supuration began, which resulted in exposure of the outer surface of the graft for several weeks, but the wound eventually closed, and the vitality of the graft was not interfered with, firm union resulting at both ends (Fig. 7). There remained, however, a depressed scar, adherent to the bone. On October 15, 1920, this scar was excised, the skin edges were undermined for some distance, and after complete hemostasis a strip of fascia lata from the left thigh was inserted into the pocket under the skin, being retained in place with a few catgut sutures. The wound was closed with interrupted sutures of horsehair. In this manner the depression was obliterated. The wound healed without complications, the sutures were removed on the sixth day, and in ten days the patient was up and about.

So far, we have succeeded in restoring the continuity of the jaw, have corrected to some extent the external deformity, and provided a firm basis for an artificial denture. The latter is now undergoing preparation by Dr. Aiguier.

I believe this case shows that we have in bone grafting a valuable help for cases, of which there are not a few scattered throughout the country, of large loss of substance of the mandible either from necrosis or other disease, and which have hitherto been regarded as beyond surgical help and only amenable to palliative measures.

THE LINGUAL ARCH LOCK*

BY HERBERT A. PULLEN, D.M.D., BUFFALO, N. Y.

DURING the past year many varieties of the lingual arch lock have appeared, each with its own peculiar claim of efficiency, inconspicuousness, or lack of interference with the soft tissues. A number of these various locks are shown in Fig. 1. The type which has been more generally used is shown at A, the lower locking arm, of smaller diameter than the base wire, extending distally from its soldered attachment to the base wire. Various materials from gold

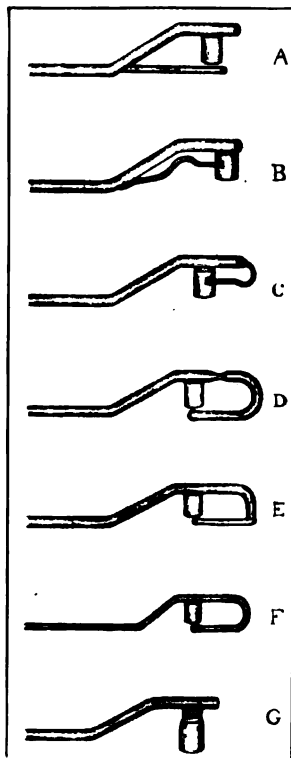


Fig. 1.

and platinum to pure gold have been used for this lock arm, some orthodontists preferring a spring wire of gold and platinum, others a lock arm which can be bent out to unlock the mechanism, and bent in to lock it, using a 20 K gold wire or one of pure gold. The latter material, while very pliable, will not stand the wear of frequent bending but the 20 K gold wire will endure throughout the treatment satisfactorily. The advantage of a lock arm that will bend is that there

*Clinic before The American Society of Orthodontists, Atlantic City, April 30, 1921.

is no spring to resist the placing of the half round rod in the half round tube and it is also readily unlocked by bending the lock arm out of position first.

The writer is convinced, although opinion is divided on the subject, that the distally extending lock arm as illustrated at *A* and *B* is not as simple or as efficient a lock, or as easy to unlock as the mesially extending lock arms shown at *C*, *D*, *E* and *F*.

Attention should be called to the unusually refined modification by Dr. Murless of the distally and mesially extended lock arms at *B* and *C*, and the insertion of the ends of these lock arms in sockets in the side of the half round tube. This locking device is inconspicuous, and out of the way of the tissues, although a little complicated to construct and manipulate.

The form of lock illustrated at *D*, being a construction of the 19 gauge wire bent upon itself to form the lock, is the simplest form of lock yet made, being easier to unlock than a distally extended lock, and requiring a less number of soldering operations to construct. In order to lessen the strength of the spring in unlocking it, the circumference of the wire may be grooved so as to present a section of smaller diameter, and hence less resistance to the effort made in removing the attachment.

A modification of this lock at *E* consists of a soldered arm of 20 K gold wire which can be easily bent outward in unlocking and inward in locking the mechanism.

When the lingual arch is entirely constructed of .030" wire, the lock arm being a continuation of the base wire as at *F*, the resistance of the spring in the lock arm is just about right for easily springing the lock arm out and in during removal and insertion of the appliance.

This brief analysis of the lock attachment to the lingual arch would seem to confirm the oft repeated axiom concerning the simplicity of construction of machines, for the lock with the least number of soldered attachments, with the lock arm extending mesially is in theory as well as in my own experience, the most efficient, and most satisfactory.

An ingenious modification of the arch lock by Dr. F. Merrill Weeks is shown at *G*, the locking device consisting of a spring lock in the tube itself, which is thinned on the upper edge and contoured in to fit a narrower portion of the short rod when it is inserted in the tube. This lock does away with the necessity for an extension of the base wire for locking purposes and represents the simplest lock which has as yet been presented, although its construction is a little difficult.

In all of these locks, a slight narrowing down of the end of the short half round rod will enable one to more easily insert it in to the half round tube.

The formation of both rod and tube in the shape of a truncated cone cut in half lengthwise has been suggested as being of a form which would allow much easier insertion and removal of the rod, and the next development of the lock will probably be along this line.

THOUGHTS ON ORTHODONTIC TEACHING WITH PRACTICAL RESULTS*

BY G. F. CALE MATTHEWS, L.D.S.

THE invitation to give a paper before this Society finds me in a position of apprehension. The difficulty is the choice of a subject. To choose any one special part of the great specialty of orthodontia and present anything new, may only involve us in a debate, which will have no definite result, and the value be lost in side issues which bulk so largely in any discussion.

Experience of twenty years of orthodontic study and practice and some ten years of active and definite teaching has led me to some conclusions which I venture to put before you this evening, in the hope that something may result which will afford us an interest which is at the moment lacking.

I do not propose to enter into any questions tonight of treatment, diagnosis or apparatus, but to generalize on the question of orthodontia and the attitude the profession takes in regard to its practice. Is it one of silent contempt due to many causes? Or, is the lack of interest due to the great amount of work which awaits us and prevents research in this and so many branches of our specialty? May I digress for a moment and ask your permission to state briefly the position of orthodontia in this country? This Society was formed by a few enthusiasts to study orthodontia as a live science, and one may assume thereby to be helpful to the profession and through it to the nation. After years, what is the result—a very small Society doing a useful work in a very limited sphere—its meetings largely confined to individual criticism and ideas of treatment—no enlarged view of the usefulness of work that may be done and should be encouraged—and in consequence still an indefinite idea in the mind of the average general practitioner that orthodontia is anything more than a fad and only for the specialist, and cannot be undertaken save at great personal worry and disappointment.

With this attitude I entirely agree and for this reason that no endeavor has been made by individual or school to educate and instruct the profession or public in the value of skilled treatment. It must be remembered that the bulk of practitioners do not read any great amount of current dental literature.

A difficulty to combat is the lack of appreciation of the principles involved in the discussion of any point (apart from the obviously simple), which is so entirely essential in the study and practice of orthodontia, and with all respect to some, treatment so often follows a line of compromise that the underlying principles probably get lost in the transaction. Too often difficulties are foreseen which never arise, likewise too, cases are regarded as quite

*Read before British Society for the Study of Orthodontics, Feb. 9th, 1921.
Illustrated by Lantern Slides of Models of Cases before, during and after Treatment.

simple which involve considerable treatment to correct a slight deformity; often, too, cases presenting apparently considerable difficulty suddenly resolve themselves beyond one's most sanguine expectations. How to deal with all types in so confident a manner that all anxiety can be eliminated is still far from possible, and may never be probable, but it is only by constant observation and the close attention of many workers that any advance is likely to come.

Thus the casual worker in private general practice can hope to get very little further, as the limitations are too manifest to allow of sufficient experience.

"Experientia docet" might easily be the title of this small paper, and not in the satisfied sense of the egoist, but in the wider sense of a limited satisfaction of small things accomplished and hope of greater things to come. Experience is the ablest teacher in the school of orthodontia, and this makes the practice so unalluring to the many, the opportunities of gaining the necessary experience being limited to the practice which must be done but is not encouraged; but the responsibility is still heavy on those lonely practitioners who make no practical effort to deal with the subject, and leave their patients to grow up with existing deformities or mutilated dentures.

A few enthusiasts whom we all know are called upon time and time again to diagnose and give an opinion on a case which is of special interest to a given practitioner. If that opinion is asked for in an open meeting by means of a casual communication, the immediate result is most likely to develop into a debate on a particular type of mechanical device, which may or may not be within the mechanical ability of the practitioner to operate, so the incident closes without anything definite having been derived, and the seeker after information possibly and probably retires from the fray in a more confused mental condition than before he asked for information. Now it is obvious that it is quite an impossible task to define treatment of a case to anyone not thoroughly versed in the whole theory and practice of orthodontia as recognized with the present knowledge and experience. The schools have persistently refused to recognize the subject with any definite syllabus and practice, and the final examinations are devoid of any real appreciation of the value of its practice to the qualifying student. The lack of any definite teaching leaves men to their own resources and their inclinations being possibly toward the easiest solution of an apparent and present deformity, a treatment is adopted which may ultimately ruin a denture which could have easily been rendered efficient and artistic.

So much could be done if the schools would adopt a definite system of teaching, recognizing that orthodontia has proved its right to be considered an important part of a student's curriculum, and that it is quite as important to know how to treat the deformity existing in a child's developing denture as to place sixty or eighty more or less indifferent gold fillings in teeth which could be equally well filled and perhaps more lastingly preserved with other materials.

The difficulty of obtaining teachers must for some time be considerable—

no one should be allowed to take full responsibility in this work whose only credentials are theoretical—a wide experience of actual practice should be a *sine qua non*. This under our present system is impossible, but with a wider outlook sufficient enthusiasm should be forthcoming to make this both possible and remunerative. The question of the “right to live,” may have some effect on the situation, but given the right man with proved ability, the support of his colleagues should be sufficient to free him from financial anxiety. An essential trait in the successful practice of orthodontia must be a real fondness for children, with unlimited patience if necessary. These advantages are not possessed by all and it is well for the man who thinks of specialization to consider these two essentials before embarking on this work.

With a desire to get something definite decided, a teaching method was started at the Birmingham Dental Hospital on standardized lines.

After a little time, two or three years, sufficient impression had been made on my colleagues for them to agree to some change in the curriculum, and coincident with this I was appointed lecturer at the University. Now there was some responsibility and with that responsibility the opportunity to get to work. No originality can be claimed for the syllabus as given—it is obvious that headings of lectures can only convey limited meanings; but the point is that by combining the work of lecturer and orthodontic surgeon one can carry one's work through on a regular plan. It has been a one man show entirely; in this sense, that it has been a lone road to travel and one has had none of the advantages of discussion with one's colleagues such as could occur in London, and with the exception of an occasional chat during a visit, experience and reading have been the only guides possible. Our duty as teachers I understand to be the efficient training of the average man to regard his professional obligations seriously and to render him capable of recognizing the various pathologic conditions, and when he may be called upon to treat them, to do so with the best that is in him. If any part of his curriculum is deficient, so much is lost to him and to those who come under his care.

To illustrate the entire apathy of the profession toward orthodontic practice one has only to realize that no one is specializing in the whole country with its 40,000,000 of population and the perniciously ignorant practice of extraction still holds sway.

Why are there not fifty orthodontists practicing in this the greatest city in the world? It cannot be through insufficient work to be done. Is it our curious national disinclination to split our work? Is it a dislike of or disbelief in the work itself? Or is it a false premise that no one in this very conservative country of ours would have the support of his colleagues to enable him to exist? I do not venture to reply to these questions.

The responsibility of the school dentist is very heavy in this respect, but the difficulty must be overwhelming. Only the simplest of cases could be treated with the time at his disposal. What is the remedy for all this well-known deficiency?—the establishment of clinics for orthodontia work only, which could be staffed at the present time by enthusiasts; so we must rule that

proposition out and trust to the future to bring us forward by the demand of the public for service in this essential department of our work.

What is the result so far of what I fear you may think very obvious and also very personal reflections?

One of the difficulties in advising the man in practice is that of being up against something. An antagonism, unconscious perhaps, which has grown from the early days when during studentship disappointment may have followed disappointment, and that ten minutes allowed to examine two or three cases, diagnose and define treatment in the final examination seemed so short; and having defined a treatment, the greatest hope of success may have been due to the number of permanent teeth advised to be removed.

The illustration of cases in journals does not always have the desired result—they may be regarded as fakes and not to be taken seriously, but immediately a student is shown his own capability this attitude of derision vanishes—not so with the practitioner, it is either “I do not treat regulation cases,” or “I remove the teeth and hope for the best.”

A definite requirement of accomplishment is now demanded of every student in the matter of orthodontic work.

This obviously is often regulated to a man's capacity, nevertheless it is essential that he fulfil certain duties. A minimum of four completed cases—two Class 1 or neutroclusion, and two Class 2 or distocclusion, with any type of apparatus suitable. Any cases of Class 3 or mesiocclusion being non-compulsory.

The war called a hiatus in the number of students available and a sudden drop from thirty-eight to four rendered the department almost inoperative for a time. With normal conditions again a big influx of students and overwhelming material there are now some 250-300 cases under treatment. The method is simple. The children are seen in the examination department, and then passed along to me. They are allotted to the student who requires a case. He then fills one of the cards as shown on the screen with all available history and takes impressions. With the models and patient a diagnosis is made and treatment defined—the apparatus obtained or made as the case may be, and the student carries on with occasional inspection or help as required, remembering that coincident with his starting treatment he is also taking or has taken his lectures. That is a point of great help. The lectures are almost entirely by lantern slide, diagrams and specimens and are thus practical, interesting and easily understood. Questions are also encouraged, and a feeling of interest and camaraderie engendered.

There is no elimination or picking of cases. All cases are treated as the accommodation occurs. Difficulties are not to be avoided but to be surmounted; and I think you will gather from the slides that we do not fear difficulty. It happens that a student may be unable to complete the case, if needing long treatment, during his time, particularly if taken late in his career; under those circumstances proportionate credit is given him; but to avoid his successor having an easy finish I may complete the necessary attention or hand it to a senior student who is keen.

It is necessary to remember in this connection that the teaching is entirely toward the ideal and the full appreciation of the facial contour shall play an equal part in the correction of the deformity. To many this comes as a surprise. My theory is that if a systematized method has been taught and shown to have satisfactory results the student will hesitate to resort to irregular methods later when thrust on his own resources, and proof of this is constantly arising by the evidence of enthusiasm among the younger, sincere qualified men and the students themselves. It is not an uncommon thing for an earnest student to have as many as eight or twelve cases running at a time.

Now may I for a moment say a word on types which I have definitely laid down for treatment as the result of experience, not that I wish you to discuss this debatable point tonight, but to prove to a student his capabilities and to give him confidence. Under no circumstances are teeth removed to "make room" unless irreparable, particularly so in neutroclusion with high erupting canines; this is my particular fad, for I regard this type as being steadfast, and a due appreciation of the facial contour will convince the most sceptical that of all the teeth the canine is probably the only one correctly placed, owing to its late development. Expansion plays the initial part in general treatment, and I would like to place on record my personal gratitude to Mr. Badcock for his useful device; in fact I am often inclined to remark: "*Expansion! expansion! toujours expansion!*" Distocclusion cases are treated in the generally recognized and orthodox manner.

It is customary to use the appliances of the B. I. Co. for economy in the case of fixed appliances with ordinary expansion arches.

The expansion plate with a slight modification of the one known as the Badcock, *i.e.*, the labial arch is carried behind the last molar rather than as a crib of the first permanent molar. Apart from any debatable point in this I find it removes a technical difficulty in avoiding the damaging of the model in fitting; the average student not being a very skilled mechanic in orthodontic apparatus.

Jackson appliances are occasionally made, but they involve rather more time than a student can always spare.

LINGUAL ARCHES BOTH FIXED AND REMOVABLE

An endeavor is made to choose the most suitable appliance. A difficulty often to be overcome is the cost of these more delicate appliances—but many students will purchase their own precious metal rather than be debarred treating the case along suggested lines.

The result of some cases I venture to show you presently with the help of the screen. The preparation of models I will ask you not to be too critical over, as their correct orthodontic illustration requires much time, and many of these slides were taken hurriedly in the midst of the war under difficult circumstances.

Some modification of instruction has been necessary this year owing to the great amount of work, and there is not the possibility of giving so much

individual attention. But I give a demonstration or illustration of the fixing and fitting of all types of appliances to classes of six or eight at a time, and thus they can carry on with very little assistance.

The most satisfactory feature is a keenness and appreciation of both student and patient, and I have had more joy in my teaching work since I have taken this subject than in all the years before. The slacker does not practically exist—the plausible one may be present, but the force of example is generally sufficient to induce him to get along with things, and in the end he will acknowledge his regret at not getting going earlier. The result I hope from this initial training is a body of earnest general practitioners who will endeavor to do the right things, and if beyond their capacity will recognize that fact and ask advice or pass the case along to one more capable.

Time allowed me is short and I should like to run through some slides to show you results obtained. I do not think we can discuss the treatment adopted tonight, but you may gather from these slides that the cases are not like Bill Adams' famous army, but are taken seriatim.

These cases are mixed in the sense that some are from my own practice while others are student's work. I will endeavor to remember which, in passing. They are mainly taken, with one or two exceptions, as types which are common, as is obvious to you who have so much experience.

A point I would like to make is that in so extensive a practice as develops in a hospital, diagnosis has to be made quickly and systematically, and while it may be necessary to change the method of one's treatment, it is advisable that care should be exercised in giving a diagnosis and classification.

In doubtful cases of distoclusion due to mutilation or causes which have obviously led a case to change its class, I do not hesitate to classify in its present condition, but may treat on the lines of another classification. In this sense a distoclusion may develop in a case of neutroclusion, due to the crowding of anterior teeth, to treat this as a pure case of distoclusion is to court failure from the start—whereas the correct alignment of the upper anterior teeth will so liberate the mandible that a normal occlusion becomes automatic.

Since writing the foregoing I have had the good fortune to see a great number of radiographs passed through the lantern consecutively.

The conclusion was gradually borne in upon me that most of the troubles which the x-ray is called upon to decide definitely are due to faulty occlusion from many causes, among them being extraction, judicious or otherwise, faulty fillings not fulfilling their requirements, badly occluded crowns, spaces unfilled by prosthetic restoration, all pointing to lack of function, with consequent absorption of alveolus, tilting of teeth, elevation, pocketing of gingival margins thus opening the way for pyorrhea and the eventual loss of teeth, with the probable accompaniment of ill-health. How much of this might have been prevented if correct occlusion had been established and proper function maintained? For this reason alone, does not the practice of orthodontia justify itself? The alarms raised by some that the prolonged wearing of apparatus is and will be a definite cause of pyorrhea has yet to be

proved. Anything may happen with ill-designed, carelessly applied apparatus, but this does not establish a case against the practice of orthodontia, as so many assume.

I can assure you that it is quite an uncommon thing for any serious condition to arise in connection with the soft tissues with student's practice, the careful explanation of the obvious causes of discomfort due to faulty manipulation assisting the student. I do not wish you to assume that there is any fool-proof system adopted, but the possibility of constant insistence of the necessary caution is very helpful. This is possible from the twofold position occupied, viz., lecturer and orthodontic surgeon.

You will pardon any apparent egotism in these few remarks. It is so difficult to avoid the personal note. My whole desire is to create a wider horizon to show that such important work is largely possible to the man of ordinary intelligence and capacity, and that the stultifying result of the too obvious criticism of things that may happen has a demoralizing effect on the advancement of any subject and more particularly on such a one as orthodontia, in the practice of which evasion of responsibility is regarded as a virtue.

At present the great difficulty of passing on cases for supervision or continuation of treatment is almost insuperable, and thus treatment has often to be delayed or abandoned, particularly where great distances separate the dentist from his patient, and the schools are not very helpful in this respect, though in some the half-term holiday allows a visit. Consequently a course has to be adopted which prolongs the treatment.

Before closing these remarks I must offer my thanks for favors already received and more to come, to Mr. S. H. Roe, who has lately transferred his affections from the prosthetic to the orthodontic side; we are thus enabled to superintend the whole of a morning's work between us by division of labor. Also the very loyal help of our Dean, Mr. Thompson Madin, whose enthusiasm has enabled me to carry matters this far.

Please remember that like yourselves I am in general practice (unfortunately), and today that involves a very steady and arduous occupation, at any rate in the provinces, so that any possibility of indulging in fancy specimens or to preparation of models becomes an impossibility from the mere shortness of time. I thank you for a patient hearing. I may have said some apparently unkind things. They are not meant to be so; they are given with the sincere hope of enlisting sympathy in the work; work which when once established on a sound basis would do much to improve the health and appearance of the young and future generations.

There is as you all know a very great satisfaction in restoring or reducing to a perfect occlusion an unsightly and inefficient denture.

The schools should be unanimous in teaching methods of orthodontia. A schedule should be drawn up on the evidence of the highest development of orthodontic knowledge, and the subject should be given its due place in the higher examinations, particularly those for a Degree in Dentistry. School dentists should have a sound working knowledge of orthodontic principles.

and if unable to undertake treatment should work in collaboration with an orthodontist wherever a clinic exists.

It is astonishing the amount of work that can be accomplished in systematic routine.

It is quite possible that in large centers, or where schools exist, an independent clinic could be established where practitioners could take a course, and students should be drafted for a definite course of lectures and practical work.

This would save expense and bring the teaching under one definite system. This does not mean that only one type of apparatus should be used or any individual's peculiar ideas dogmatized, but that the shortest possible course should give the student the best knowledge available in the time. The American courses of postgraduate work would not appeal in this country, but the possibility of creating a very useful department of our work is clearly pointed out. It must be remembered that the teaching for any of the licenses already embraces the theoretical teaching, and it is the practical application of that knowledge that is wanting.

I should like to see every school working in harmony with a definite syllabus, well considered both theoretically and practically. Would this Society endorse the following suggestions and use its influence so that:

Every school should appoint a teacher in orthodontics, with practical teaching a prominent feature.

More serious attention should be given to this subject by the examining bodies.

Every endeavor should be made to foster the practice of orthodontia and stimulate the profession towards its practice.

I have, I fear, not given you much material for discussion and may have labored the perfectly obvious, but if by such very obvious truths one can arouse interest and cause this Society to impress on the teaching authorities their responsibility in the matter of orthodontic training, some useful purpose may have been served by the time spent in listening to a "provincial" member who has had the temerity to address you.

DISCUSSION

The *President* was sure all the members felt deeply grateful to Mr. Cale Matthews for coming from Birmingham to deliver his very interesting paper and for showing such a large number of valuable slides. He knew something of Mr. Cale Matthews' work in Birmingham, and could appreciate the enormous amount of energy which he threw into his duties at the University there. The subject of the paper was one on which Mr. Matthews could speak with authority, because he had twenty years' experience in his work and had been a teacher and lecturer at Birmingham University for a number of years. The time was very opportune for a discussion on orthodontic teaching; there was at the present time a lack of uniformity in the teaching of orthodontics not only in British dental schools but throughout the world. No definite curriculum had as yet been agreed upon. But while so many matters were passing through a period of reconstruction after the war, it was natural that their Society, being a Society for the study of orthodontics, should consider how it stood with regard to the teaching of that subject and how it could best be undertaken. He was glad Mr. Cale Matthews had not dwelt unduly on particular methods of treatment and the various appliances that could be used, because at the present time it was more important to consider general

principles than details. As he had already mentioned in his Presidential Address, it seemed to him that the teaching of orthodontics should be considered under two main headings: firstly with regard to the general practitioner in dentistry, and secondly with regard to the dental surgeon who wished to specialize in orthodontics. When the question of a curriculum for the orthodontic specialist was considered, there were not so many difficulties to be faced as in the case of the general practitioner, because it would be generally agreed that the specialist should have included in his curriculum everything that really pertained to orthodontics, and the postgraduate course should be framed accordingly. As Mr. Cale Matthews had said, there should be many more specialists in orthodontia in this country than there were at the present time; and he looked forward to the time when there would be at least one orthodontic specialist in every big town, and many more in such cities as London, Birmingham, Manchester, etc. When it came to planning a course for the general dental practitioner, however, care must be exercised—as he had pointed out at the last meeting—to see that an already heavily-burdened curriculum was not overloaded. In such circumstances orthodontics could not be taught as an isolated entity, but must be regarded as an integral part of a complete scheme. There must be a short clinical course, and there should be lectures by specialists on the subject; but for the most part the teaching should be confined to fundamentals, so that when the students came to deal with cases they would be able to collaborate intelligently with the specialist and be able to work with him. Some sort of curriculum might be drawn up, but the main point was to train the students on general lines. Training in orthodontics need not necessarily be left until the final year; if the curriculum was regarded as a whole, orthodontic principles could be introduced at quite an early stage. Such subjects as the development of the jaws, the process of dentition, theories of inheritance and acquired characteristics, etc., could be brought in and applied directly or indirectly to the subject of orthodontics, so that the student would be able to take it up intelligently when he came to give it more specialized study in the latter part of his course.

Dr. *Sim Wallace* thought the author was not correct in saying that the paper did not lend itself to discussion. Time would not allow him to deal with all the points in the paper he should like to discuss, but he would like to protest against the phrase "the perniciously ignorant practice of extraction." Nearly twenty years ago he had been, for a short time, a disciple of Angle, but fortunately he came to the conclusion, by a process of reasoning and by experience, that the only sound method in many cases was to extract certain teeth, generally the premolars. Mr. Cale Matthews had indicated his love for the no-extraction theory by saying "*Expansion! expansion! toujours expansion!*" Personally, he had always desired an opportunity of getting a case concerning which he could put down in black and white the result of carrying out Angle's treatment over a period of three years and getting the teeth into normal occlusion, thereby obtaining an illustration of the merits of "no extraction." He wished to give some figures in the case of a young adult, with which he was familiar. The face might be taken as typically normal, the measurements, as given by the prosopometer, being auriculo-nasial, 98 mm., from the auricular point to the alveolus, 97 mm., from the same to the tip of the upper incisor 98 mm., and to the tip of the chin 122 mm. Coming next to the prosopometrical measurements of a lady who had been under Angle's treatment for about three years, the corresponding measurements were 97 mm., 102 mm., 108 mm., and 112 mm. He would like Mr. Cale Matthews to draw two faces to those measurements. He would find the first perfectly normal, but with the other the tips of cutting edge of the incisors are about a centimeter too far forward. Expansion was always forwards; one could not get much room by doing it breadthways. (A Member: "Why not? Certainly you can.") The reason was because there was only a limited amount of room except in the forward direction; but the chief point was that forwards was the direction of least resistance. In the case with which he was dealing, not only were the front teeth a centimeter too far forward but the chin was a centimeter too far back. Extraction was by no means an ignorant practice, nor was it pernicious. It was not done through ignorance, because it had been arrived at after studying Angle and various other people who advocated no extraction. He did not doubt that Mr. Cale Matthews would come, in time, to agree with him; and he thought that gentleman's work had had the best results, to judge from the examples given, where, either by chance or mistake, some teeth had been extracted.

Mr. Lacey said he could not let Dr. Sim Wallace's remarks pass without a very strong protest. Mr. Cale Matthews, in his paper, laid down some fundamental points, which personally he thought should be considered as the basis of all orthodontic teaching: first and foremost, the relation of the arches to the facial contour, a thing which seemed to be very often left out of account, and secondly, the question of expansion. The causation of irregularities was merely a question of the development of the bone, or its nondevelopment, and not a question of the malposition of the individual teeth. If one developed the growth of the bone in any way one obtained normal teeth in normal occlusion in a normal jaw. He felt that those two points could not be overemphasized. As Mr. Cale Matthews stated later in his paper, radiographs taken later in life showed the most pernicious effect of extraction.

Mr. Steadman said he had listened to the paper with very great interest, and had been able to study an advance copy of it beforehand. He must say that he had hoped to find broader views expressed in it, and that the author would have attempted to find out what other schools were doing. From Mr. Cale Matthews' paper one would imagine that Birmingham, and Birmingham alone, was trying to teach orthodontics, but as a matter of fact there were schools in London which had been teaching the subject for the past twenty-five years. At the Royal Dental Hospital there were men who took advantage of the enormous clinic of that hospital to add to their knowledge of some of the causes of irregularities, and he ventured to think that no school had done more to add to that knowledge than the one attached to the Royal Dental Hospital. At Guy's, too, there was another school which devoted time to the study of orthodontics, only there they did not take the same narrow views as those held by Mr. Cale Matthews. The London Hospital School of Dental Surgery had a lectureship on orthodontics which had been running ever since the school started, and one of the most distinguished Fellows of the Society was a lecturer there for some years. Mr. Matthews was also incorrect in stating that those schools had no regular syllabus.

He did not follow what the author meant when he wished for "definite practice" to be introduced. In the present state of the subject definite rules could not be laid down, and deformities were so varied in character that he doubted if it could ever be done. At the Royal Dental Hospital they endeavoured to teach the students the broad principles of the subject, and he did not think more could be done in the undergraduate stage. It was one of the chief glories of their profession that its members were always learning, always slowly but steadily advancing in knowledge. It took years to acquire even a passable knowledge of orthodontic work; and all they could hope to do in the case of students was to teach them the broad principles, and teach them to think and reason for themselves. To speak of extraction as "perniciously ignorant" was a sweeping condemnation of those who differed from the author's views, and one which he thought Mr. Cale Matthews' position in the profession did not justify him in making. In the various dental schools of the country there were men who possessed just as good qualifications as Mr. Matthews who differed from him on the question of extraction, and they were not old men either, but young and active practitioners. It was surely rather presumptuous on the part of any one man to stigmatize their practice as "perniciously ignorant."

With regard to the examples of treatment the author had shown, he said that he never took out a tooth to make room, and never took out a molar to allow a canine to come down. As Dr. Sim Wallace had pointed out, the pushing forward and expansion which might ensue would cause complete ruination of the facial contour.

At the Royal Dental Hospital, as at some other schools, they were very careful to avoid appliances, when that could be done, by judicious extraction. They endeavored to hold broad views, however, and occasionally, in suitable cases, would use fixed appliances.

With regard to making orthodontics a specialty, he confessed he doubted whether such a step would be wise. As had been said at the last meeting, specialists tended to hold narrow views, and a small band of enthusiastic men might arise whose sole aim would be perfect occlusion, regardless of anything else—regardless of facial contour, general health, and so on. That would do a great deal of harm.

Mr. Mayer said he had appreciated and enjoyed Mr. Cale Matthews' paper. Whatever other gentlemen might think of the author's methods of treatment, he personally must say that Mr. Matthews had satisfied him on every count.

Mr. Pitts thought Mr. Cale Matthews' paper rather lent itself to criticism, because the author, somewhat injudiciously, mixed up details of treatment of a contentious character with the broader question of the teaching of orthodontics. Many teachers held the view that orthodontic teaching should have its place in the curriculum of students, so that they might have some idea of the underlying principles and, what was equally important, some idea of how the various appliances should be used. Whatever views were held on the question of extraction, there were certain appliances which had to be used at some time or another. Mr. Matthews seemed to have solved the problem of orthodontic education for students at Birmingham, and on that he congratulated him heartily. It was a matter for congratulation, and a reproach to other schools, which he feared lagged behind. It was a difficult problem, because certain lines of teaching were laid down for the schools which had to be followed; the schools had to spend a certain number of hours teaching certain subjects and, when the students' time was so overloaded, it was difficult to find room for anything else. Mr. Matthews had shown that it was possible, however, given keenness and enthusiasm, and he seemed to have fired his students with his own keenness. The subject was of the utmost importance, and he hoped what Mr. Matthews had said would be widely read and pondered.

There were two small points in the paper on which he wished to comment. Several speakers had referred to the phrase which Mr. Cale Matthews used with regard to extraction. He was perfectly entitled to condemn the practice of extraction as pernicious and ignorant if he wished, but he (Mr. Pitts) wished to enter a mild protest against the employment of such terms. There were some who thought extraction was a legitimate part of orthodontics, and they were entitled to their view.

In the excellent syllabus of lectures which the author had given he would like to suggest the addition of a subsection on the influence of heredity on irregularities. That was an important subject, because the question might easily arise whether in those cases it was worth while, or wise, to interfere with a condition that was so intimate a part of the possessor's personality.

Mr. J. B. Bull said the method adopted by Mr. Cale Matthews for teaching students was in many respects similar to that in vogue at Guy's at the present time. He gathered, however, that Mr. Matthews spread his teaching over three or four years of the students' course. Personally he preferred the method recently adopted at his own hospital, by which the student was given three months intensive training in orthodontics toward the end of his fourth year. That entailed the disadvantage that a man was not able to follow his cases from start to finish, but he did see and treat cases in every stage of development during that time, and in his fourth year a student was in a much better position to benefit by practice and teaching than at an earlier stage. He thought it was imperative that, before starting the study of orthodontics, the student should be thoroughly acquainted with, and have had as much experience as possible in, the other branches of dental surgery, and that knowledge and experience was not acquired until about the middle of his fourth year. The time available being so short, it followed that as much time as possible should be spent with the patients, and not away from them, and therefore all apparatus of a movable type should be constructed not by the student himself, but by first and second year students. In that way the dresser employed on orthodontic work would gain his experience in the construction of apparatus during his first two years, and would be able to devote more time to the other branches of the subject during the latter part of his course.

He did not want to enter into a discussion on treatment by extraction, but thought that whatever views one held on the subject, it should be agreed that the "judicious extraction" method should be taught. As long as the world lasted treatment by extraction would be practised, and unless the students were instructed on that subject, when they came to practice they would be unable to discriminate between extraction which might be termed necessary and that which was unnecessary. They all wished to aim at the ideal, but in so very many cases had to come down to the practical!

The author had inquired why there were not fifty or more orthodontists practising in London at the present time. If by "specialists" Mr. Matthews meant men who confined themselves exclusively to the practice of orthodontics, he thought if there were anything like

the number suggested a great many of them would be joining the unemployed processions which were becoming such a familiar feature everywhere!

The Secretary read the following from Mr. Sheldon Friel, of Dublin, who was unable to attend the meeting:

"I am very sorry that it is impossible for me to hear Mr. Cale Matthews' paper on Orthodontic Education, and I hope he will understand that any criticism I offer on his paper is meant to be constructive, and not destructive criticism. Mr. Matthews' statements as to the apathy of the dental profession towards orthodontics are only too true. This was also emphasised by Mr. McKeag at the last meeting. It seems to me that this attitude must continue, owing to the huge field necessarily covered in the dental curriculum. The subject of dentistry exclusive of orthodontics, is so vast that few men can possibly obtain a full knowledge of all its branches, and this takes no account of the research work that is crying out to be done in order to prevent dental diseases. If, in addition, it is expected that the average dentist should be an orthodontist, it means that general dentistry will be sacrificed to orthodontics, or vice versa.

"I do not think that orthodontics should be left out of the curriculum of the dental student, but rather the curriculum should be radically altered. I feel that the student should be taught the principles on which orthodontics are based, and that actual treatment should occupy a very secondary place. Mr. Matthews rightly says that a printed syllabus of lectures conveys very little, but nevertheless I think it shows the general trend of the lectures. The following syllabus, which is almost identical with that of Mr. McKeag's in Queen's University, Belfast, is divided into twelve lectures, only three of which are devoted to treatment:

SYLLABUS

Definition of Orthodontics.

Occlusion	{	Hypothetical occlusion.
		Typical occlusion.
		Individual occlusion.

Mechanical forces controlling occlusion.

Malocclusion	{	The distinction between malocclusion and individual occlusion.		
		Classification of malocclusion (i) Angles, (ii) B. S. S. O.		
Etiology and	{	Local causes.		
Prevention of				
Malocclusion	{	General causes	{	Constitutional diseases.
				Diet
	Deficiency of vitamins.			
	Deficiency of the essentials of foods.			

Diagnosis of malocclusion.

Tissue changes incident and subsequent to tooth movement.

Treatment:—

- (i) Removal of cause alone.
- (ii) Removal of cause and exercises, etc., for the development of the forces of occlusion.
- (iii) Removal of cause and mechanical correction of the teeth.
- (iv) Extraction of teeth with or without further mechanical correction.

Prophylaxis during treatment.

Demonstrations:

- (i) Impression and model technic.
- (ii) The construction of appliances { Fixed.
Removable.

"I think that the object in view in teaching students should be to make them capable of recognizing malocclusion in its incipient stages, and that they should be capable of undertaking preventive measures, as, for example, in the prevention of mouth-breathing, improper feeding, habits, premature extraction of deciduous teeth, and finally that they should have a base-work on which they could build, if they intend at a later date to take up treatment. The way to meet the public demand for the treatment of malocclusion would be to found

a postgraduate school for orthodontic specialists. Mr. Matthews says: 'The difficulty of obtaining teachers must for some time be considerable—no one should be allowed to take full responsibility in this work whose only credentials are theoretical—a wide experience of actual practice should be a *sine qua non*.' Would it not be possible, in addition to certain teachers in this country who have a sound theoretical knowledge, to bring over an American orthodontist, who unites theoretical knowledge with a technic of very high standard. Such a school, with a course extending over eight or nine weeks, would turn out a number of orthodontists to carry out the teaching in future schools.

"I presume that Mr. Matthews did not include Ireland when he said that there were no specialists in the 40,000,000 population, as there are two in Ireland. I think the Society is greatly indebted to Mr. Cale Matthews for his paper on this all important subject."

Mr. Cale Matthews, in replying to the discussion, said that, while it might sound curiously contradictory, he felt very happy in having aroused a certain amount of antagonism. He thought anyone who initiated a discussion on a subject similar to the one which he had raised was bound to meet with antagonism, but that antagonism was healthy and beneficial in its effect.

He was sure none of those present would wish to convict him of disloyalty to his profession or to the staff of any other school, or of accusing anyone of dereliction of duty in teaching or work. Orthodontia today was largely a matter of opinion, backed up by certain facts derived from work already accomplished. He regarded the criticism his paper had met with that evening as a great compliment; he had a very sincere objection to anything in the nature of a Mutual Admiration Society; and when a man like Dr. Sim Wallace took the trouble to speak and criticize his work he thought it was a very great compliment. He did not think, however, that Dr. Sim Wallace realized that his criticism was one of the greatest compliments, in a backward way, that he could have given the paper. If he understood aright, Dr. Sim Wallace's life work was to prove the great value of function, and one of the most important things a student could be taught was to establish function. Mr. Steadman had pulled his remarks to pieces, and he was quite justified in doing so, because he had to admit that the paper had the unfortunate aspect of appearing to criticize other schools. To come down to actual facts, however, what had been the results of the teaching of orthodontia in the schools for the past ten or twenty years? Those of the members who had been qualified for some time would know how little of value the final examinations for any of the diplomas had been with regard to orthodontics. It was not the syllabus drafted by the staff, but the individual interpretation of that and the actual work in the schools which counted. Anything might be put down on paper, but if the students did not do the work they would reap small benefit from that. He knew that all the schools had a syllabus, and all—on paper—worked on more or less similar lines, and everyone hoped that in time a definite teaching system would be established such as existed in other branches of dental work. An analogy might be found in the controversy that was exercising the dental profession throughout the world at the present time, with regard to sepsis and the treatment of root fillings. No controversy in orthodontia was so acute as that. He hoped the members would absolve him from any intention of criticizing individuals when he criticized the work of the schools. A question had been asked with reference to his use of the term "mutilation," but he understood that was a recognized term in orthodontia for cases in which teeth had been lost before treatment was started. He had been very interested in what Mr. Bull had said as to the method of teaching at Guy's, and would be glad of an opportunity of discussing it with him, but he was inclined to think that three months was a very short time for a student to pick up any practical ideas of orthodontic work.

He wished to emphasise what was really one of the main points of his paper, but which seemed to have been overlooked, namely, that in the restoration of function one must have due regard to facial contour. The unfortunate case Dr. Sim Wallace had referred to might have been treated by Angle's methods, but he did not think that Angle would have obtained the result described. He had never had the privilege of seeing any patients who had been treated by Angle, but disfigurement was against all the ideals of orthodontic treatment, which were to beautify and restore perfect function.

He greatly appreciated the President's remarks. As he had already mentioned, his

only desire in reading the paper was to arouse interest in what, to his mind, was a very absorbing subject, and to see whether it would not be possible to equip young practitioners with some real knowledge of what was meant by orthodontia.

With regard to the "pernicious system of extraction," such a term did not apply to an audience such as the one he was addressing, but it must be remembered that the great bulk of the profession was practising in the country, rarely attended meetings or discussions or met their fellows, and in consequence were extracting teeth in an indiscriminate, injudicious and pernicious manner.

He must repeat that the whole question rested on a study of beauty. Anyone who walked along the streets noticing the passers-by must realize that the main cause of ill-looks was the lack of development of the mandible and ill-proportion of the mouth. As soon as proper function was restored the whole of the troubles treated by orthodontia would be improved, as would also the general health of the patient.

In conclusion he thanked the members for their criticism and those who had appreciated the few remarks for what they had said, and begged those who occupied teaching positions not to take any of his observations as being personal.

CASE OF LIP-SUCKING COMPLICATED BY RICKETS*

By B. MAXWELL STEPHENS, L.D.S.

I WAS afforded the opportunity of inspecting this case at intervals by the practitioner who treated it. He has kindly sent me models which he recently secured. A comparison of these (Figs. 8, 9, 10, 11) with the first (Figs. 1, 2, 3, 4) shows a good result, and as I think there is something to be learned from it, I have brought the case forward as a casual communication.

Rough notes from the history read as follows: Boy aged eight and a half years; has always lived in the country; mentally, lacks power of concentration; physically, well developed but stoops.

His lower lip is drawn in behind his maxillary incisor teeth, where he always seems to be sucking at it; these teeth are fairly prominent.

The mental prominence is flattened, and though the mandible is actually only slightly retruded, the profile of the face has a semblance to that of one with a chop-chin.

There is no history of similar dental malformation among his family, though in passing, and it is of interest, there is one of hyper-secretion of the thyroid gland.

Inquiry as to conditions in infancy showed that he was bottle-fed, rickety, cut his teeth late, only commenced to walk at three years of age. At five and a half years adenoids were removed; following this operation he has always breathed normally.

You will see from inspection of the models, that the teeth are large, and that the mandibular incisors have been shot up irregularly (Fig. 2), into the maxillary arch (Fig. 1), the buccal surfaces of the centrals being, if one may misuse the term, in lingual occlusion with the palate. There is some narrowing both of the maxillary and mandibular arches in the molar and premolar region, with marked lingual tilting of the first mandibular molars. The correction of this tilting would considerably shorten the length of the overbite. Obviously these arches lacked growth in the early stages of dentition.

The central incisors erupted, but lateral pressure created by the development of the laterals and canines and the actual eruption of the former, forced them upward until they impinged upon the soft tissues of the palatal margin.

The child experiencing discomfort, interposed the lower lip as a shield, thereby causing the centrals to be thrust further inwards; these caught into the vault of the palate (Fig. 1), the malformation was completed.

Treatment consisted in capping the deciduous mandibular molars, thus lifting the bite from the permanent molars which were then thrust outward by finger springs; this increased their height in the arch. By finger springs also the

*Read before British Society for the Study of Orthodontics, Feb. 9, 1921.

mandibular incisors were gradually pushed forward, and at the same time an upper biting plate was inserted to assist in depressing them. Later, both arches were expanded.

The last models were taken when the boy was twelve; the operation

Fig. 1.—Frontal view. Model tilted showing lower central incisors caught within palatal vault.

Fig. 2.—Occlusal view showing bunching of lower incisors.

Fig. 3.—Right lateral view. Permanent lower molar in distoclusion.

Fig. 4.—Left lateral view. Permanent lower molar in distoclusion.

from various circumstances spread itself over three years, but opportunity was unfortunately lacking to complete the expansion of the arch in the molar region.

I wish, in concluding, to make two points:

1. That where there is lack of development, the deciduous arch should

be spread early enough to ensure sufficient space for the incisors and canines to develop and erupt freely, preferably about six years.

2. That though, at first sight, the prognosis of this type of case would appear to be unsatisfactory, with tenacity on the part of the operator, a simple line of treatment brings about a normal resolution of the malformation; but the etiology must be carefully studied.

Fig. 5.—Frontal view showing movement forward of lower incisors. Intermediate case.

Fig. 6 Occlusal view.

Fig. 7.—Frontal view. Final stage.

The second case I wish to show is one of unilateral distoclusion with marked overbite. This child, a girl aged four and a half years, took one and a quarter hours to eat her mid-day meal of meat, vegetables, and some form of cereal pudding. Though there was little decay visible, it luckily suggested itself to the nurse that something else might be wrong with the teeth, and

Fig 8.—Occlusal view. Final stage.

Fig 9.—Right lateral view. Intermediate stage, showing forward movement of mandible.

she was brought to me. I took impressions and when these had been cast, an examination of the lingual aspect of the occlusion showed only a minimum surface of the molar teeth in opposition, and that the mandibular incisors impinged upon the opposing palatal surface. (Figs. 12, 13, 14, 15.)

The time tonight is too short to go into the etiology of this malocclusion,

which would otherwise prove of interest. I will therefore pass on to a short survey of the child's general condition.

As she sat in my chair she was lethargic and obviously lacked energy: it seemed to me that a vicious circle, initiated from want of masticatory

Fig. 10.—Right lateral view. Final stage.

Fig. 11.—Left lateral view. Final stage.

power, had probably been set up embracing the digestive tract: food insufficiently prepared for further digestion had been passing into the stomach. I found she had become habitually constipated. She was thus constantly re-absorbing products from the material which should have been evacuated.

By way of treatment I inserted a biting plate (raising the bite in the incisor region) with a small-sized Badcock's screw to accomplish expansion. As soon as she had become used to the presence of the plate, I severed it in the usual manner and began spreading the arch.

After a couple of weeks she commenced to masticate her food quite comfortably on the plate; her general tone improved, the mentality was quicker

Fig. 12.—Showing depth of overbite. Observe misplacement to right of center in mandibular arch

Fig. 13.—Occlusal view, showing partial rotation of lower central incisor.

Fig. 14.—Left lateral view showing occlusion of second molars practically normal.

Fig. 15.—Right lateral showing distal occlusion of second molars.

and she was full of movement. Seeing her after an interval of two months, I scarcely recognized the individual.

At the end of five months, I started expansion by a plate in the mandibular arch, so as to restore support to the bite in the molar region. At this stage I usually substitute a biting plate without the expansion screw, as this overcomes the difficulty which occurs when the child is eating.

I am led to make the following remarks, the first of which is practically

a reiteration of the conclusion in the previous case—namely, that if the arches were not being spread early there would be insufficient room for the lower incisors to erupt, and this case would otherwise pass on and enter the same category as the preceding one.

The second is, that it is no exception of course to meet with this type of case in practice, but that when I observe there is much overbite, not having already done so, I examine the child's whole being critically. I ask whoever is with them, among other questions, if the meals are eaten slowly and whether meat causes a difficulty in mastication. If the answer is in the affirmative I secure impressions, and with very young patients this demands both strategy and patience.

The advisability of treatment can then be considered and the condition explained. It is essential that we should bring to the notice of the medical attendant and the parents the evil effect of leaving these youngsters to struggle on with a dentition with which they cannot masticate. Treatment should never voluntarily be delayed.

It should be borne in mind that at this stage simple forms of appliance to a large extent correct the tendencies to malocclusion; such appliances are readily worn and their presence in the mouth is, as a rule, not resented to the same extent as later on; also visits can be obtained without interfering with the schooling.

It remains to add that we should use every opportunity of educating ourselves sufficiently by study and observation of the normal, to be able to detect at once the earliest signs of the abnormal.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Shall Pulpless Teeth Be Retained in the Mouth? M. E. Peters. Dental Cosmos, 1921, lxiii, No. 1, p. 1.

No inflexible rule can be laid down for the retention or extraction of all pulpless teeth, but the decision must be guided by the physical condition of the patient, the condition of the apical and periapical tissues, and the skill of the operator. Although extraction and root-canal treatments may remove infection, the prevention of even small cavities and the maintenance of the gums in a healthy condition must be the aim and object of progressive dentistry. The extraction of a tooth, breaking the arch, produces a condition inviting infection about other teeth due to the establishment of faulty contacts. No artificial device has yet been worked out to replace missing teeth, which is not an irritant to dental or peridental tissue. Physicians and roentgenologists should abandon their present practice of diagnosing oral conditions from radiograms alone and advising the extraction of teeth without consultation with the dentist. The latter should report oral foci of possible systemic infection to the patient and the physician. An effort should be made to eradicate all such foci. Extraction and curettage is the quickest and probably the most certain method of eradicating apical abscesses. A very large percentage of apical radiolucent areas disappear following careful root treatment. Physical symptoms seem to disappear following careful treatment of septic teeth. Before resorting to extraction, attempts should always be made to cure and preserve teeth which are infected. Many physicians have found it much easier to discover a few shadows on dental films than to make a thorough physical examination, and the dentist has found it easier and more profitable to have a tooth extracted and bridge the space than to spend the necessary time in doing a thorough root-canal treatment. It is impossible for either the physician or the roentgenologist to interpret conditions accurately from radiograms alone. But radiograms of all pulpless teeth in the mouths of the dentist's patients should be made at least once each year and the condition be compared with that existing before. Further treatment must be governed by individual requirements.

Dental Anomalies. P. Kranz. *Correspondenz-Blatt für Zahnärzte*, 1920, No. 4, p. 18.

The author essentially restricts himself to a discussion of hypoplasias, more particularly of so-called leutic teeth. His clinical findings show that all dental anomalies occur with no greater frequency in luetic patients than in persons free from lues, but that the same anomalies are much more common and extensive in cretins without syphilis. The percentage of luetic patients with normal teeth amounted to 41.66; but there were no cretins free from syphilis with normal teeth. Numerous other common findings are suggestive of internal secretory disturbances as the universal cause. It is not yet possible to decide if the thymus, thyroid, or parathyroids, or rather the hypophysis or the gonads enter into etiologic consideration in these cases. Dental hypoplasia must be interpreted as the result of a disturbance of general character at the time of calcification of the teeth, and in all probability, disturbances of the endocrinic glands act as the etiologic factor in this disturbance of the calcium metabolism. The individual forms of hypoplasia, in syphilitic patients as well as in those free from syphilis, and in cretins, present in no way special different characteristics pointing to a specific virus. Negative spirochete findings in all examined congenital luetic tooth germs; normal dental findings in all those cases where normal thyroid parathyroid, and thymus glands could be demonstrated in cases of congenital lues; invariably abnormal pictures of tooth germs in the cases which presented well-marked degenerations of thymus or thyroid; and especially the abnormal calcification, as found by the author, again confirm his suspicion that these changes in the tooth germ are produced by no means through the syphilitic virus as such, and especially not by the spirochetes in loco, but that dysfunctions of the internal glandular apparatus must be held responsible for the production of the dental hypoplasia. The disturbed metabolism of several, if not all, of the endocrinic glands is undoubtedly of extraordinary importance for the development of the teeth.

Bucco-dental Foci of Infection and Their Relations with the Organism. T. B. Patrone. *La Odontologia*, 1920, xxix, No. 9, p. 390.

The study of the remote influence which local infectious foci of the mouth and teeth, such as abscesses, pyorrhea, etc., may exert in the organism has led to much bacteriologic investigation and clinical observation, without the accomplishment of definite conclusions. Cases are often seen in which individuals with a very bad condition of the teeth and the resulting buccal affections nevertheless enjoy excellent general health and never complain of pain or other disturbances not connected with the teeth. On the other hand, individuals possessing teeth in a splendid state of natural and hygienic preservation, who have never had to seek odontologic assistance, have been known to present general or local diseases such as are usually attributed to bucco-dental factors, on more or less insufficient grounds. The reason is that all diseases require a favorable territory for their development, and in its absence, the infections are checked by the barriers of natural defence opposed by the

intact organism. The author is convinced that the infectious foci of the mouth may act in the organism as the direct cause of various affections, or aggravate diseases produced by other causes; but he is equally certain that this causative relation is not always admissible. This opinion is confirmed by practical experience during many years in his clinic, and also by the findings of other observers. Dr. Etchepareborda, writing in the *Odontologia Argentina*, 1920, reports an instructive case showing the influence of bucco-dental affections on the general condition of the system in an unmistakable manner. The patient, a woman 45 years of age, of good constitution, with an excellent record, was fitted with partial bridges in the upper dental tier of the left side, and two crowns on the right side. Sometime afterwards, she noticed the first symptoms of disease, in the form of loss of strength, great restlessness, without demonstrable cause; slight fever; transitory edema of the face and neck on the left side; and manifestations of great weakness. These pathologic phenomena increased progressively, and the edema frequently recurred, simulating the presence of Bright's disease. Radiographic findings were completely negative, but the bridge work was removed, with the result that immediate improvement followed. This case convincingly shows the relation from cause to effect of the teeth to the general condition and the possible action of dental foci through toxins, before radiography reveals dental lesions in the periosteum or in the osseous tissue. However, the action of bucco-dental infectious foci is by no means necessarily serious or inevitable, and the author recommends a calm, conservative attitude in all cases, before proceeding to the performance of odontologic operations in doubtful or obscure cases. After consultation with the patient's medical advisor, and only when both opinions are agreed, the extractions may be made which appear to be indispensable on the basis of the existing symptoms. The physician in his turn should always consult with the odontologist in a pathologic case where the bucco-dental conditions may be suspected as an aggravating cause and where its improvement may act favorably upon the patient's restoration to health.

Stereoroentgenography in Dental Radiology. C. A. Lemaster. *Hettinger's Dental News*, 1921, iv, No. 1, p. 3.

In this brief contribution, the author aims at illustrating and emphasizing the benefits which may be obtained from a judicious use of the principle of perspective in dental radiography. Flap pictures are usually unreliable in three groups of examination: Localization of foreign bodies, orthodontia, and exodontia. Definite localization of periapical destruction may also be included, which is brought out by stereoroentgenography. With special reference to orthodontia, the following is a typical example: In case of an unerupted upper central incisor, a flat picture seemed to show a malformed tooth, rotated sharply in the middle in such a manner that both the occlusal surface as well as the apex lie directly upward. Stereoroentgenography proved the tooth to lie practically at right angle to the plane of the others and to be a normally formed tooth; the apex appeared labially and slightly pushed downward; the

shadow of the root which was thought to be part of the tooth itself was the remaining and partially absorbed root of the deciduous tooth. Its position with reference to the surrounding teeth and structures was plainly and accurately indicated. In another case, concerning a child of nine years, the so-called flat picture (radiogram) of all anterior upper teeth showed all deciduous teeth still in place, with the erupting permanent teeth beneath, the permanent teeth appearing to be in perfect positions for normal eruption. But the stereoroentgenogram showed the proper relation of the permanent teeth as they really were, in the process, centrals and laterals were out of line of eruption, being misplaced considerably labially. A radiogram of this kind gives the exact relation of the long axis of the permanent unerupted teeth to the long axis of the deciduous teeth, a very valuable diagnostic point. Stereoroentgenography is of unquestionable value whenever the peculiarities of the case demand accurate differentiation between the various planes in which the structures to be studied come to lie. Perspective lends additional value to the radiogram.

Etiology and Treatment of Ulceromembranous Stomatitis. Bercher. *Revue de stomatologie*, February, 1921, xxiii, 2.

The author, who is stomatologist to the great Val de Grace Military Hospital, takes issue with certain recently published statements concerning Vincents' disease as it affects the gums. Admitting the role of the Vincent spirochete-fusiform symbiosis in the production of this malady, the predisposition is nevertheless all important. These according to the author comprise general disturbances, the eruption of the third molars and certain results of reflex alveolar-gingival irritation. The first two are generally admitted as factors, while the third, which originated with the author has not yet been conceded. The point is of capital importance because in such cases the author claims that the salvarsans are inert. In a case cited by the author treatment of every kind failed, even extraction of the upper wisdom tooth of the affected side. Intravenous salvarsan brought no improvement. The wisdom tooth of the mandible on that side was then extracted and the condition after four months of activity ceased spontaneously. In the author's opinion the last-named tooth exerted a reflex trophic influence on the gums which lowered the resistance to Vincent's microorganisms. The reason for the behavior of this tooth was not anomalous eruption but an arthritis resulting from malocclusion, the latter in turn being due to loss of the other molars in the series. In a second case extraction of the third molar did not give relief as was expected but later it was learned that the dentist had left a broken root in the alveolus. After this had been extracted the stomatitis healed of itself.

Local Anesthesia of the Mouth and Teeth. Mayoral and Landete Arago (Madrid). *La Odontologia*, January, 1921, xxx, 1.

The authors discuss four methods of injection—intrapulpar, intraarticular, subgingival and intraosseous. The first-named is used in connection with devitalization and the author passes over this subject to mention the intra-

articular form which is indicated in pulpectomies and extractions, especially of mandibular teeth, but apparently only when subgingival anesthesia is insufficient. The latter is the method of choice for most dental work in which the gums and pulp filaments must be anesthetized. As a rule anesthesia of the vestibular aspect suffices in the upper jaw while it is well to avoid anesthetizing the palatine side because of the nausea which sometimes results. Only in certain cases of calcareous or necrotic degeneration of the pulp is it necessary to anesthetize the palatine aspect first. Intraosseous anesthesia is used in cases of complicating infection which is localized, and is mentioned only in connection with mandibular anesthesia. Space does not suffice for a digest of the author's technic. Of the four methods the subgingival is far less burdensome both for dentist and patient and the others are all reserved for exceptional cases. As a rule this use is not made until the ordinary subgingival method has failed. The author confines himself to one anesthetic without regard to the method used—this is the ordinary 2 per cent novocain solution. In many cases however a 1 per cent solution will suffice. The usual 0.004 per cent of adrenaline is added to these solutions and all manipulations in making up these solutions are effected in an atmosphere free from oxygen, the author using one of carbon dioxide.

Importance of Oral Hygiene During Childhood. H. B. Butler (Washington).
American Journal of Public Health, April, 1921, xi, 4.

Study of many skulls of children from 200 to 300 years old of native North Americans preserved in the National Museum showed but a solitary carious tooth. In contrast with this showing the author cites the fact that over 7000 children in West Virginia presented over 16000 unfilled cavities, or over 2 per child. In a large number the lower jaw was undeveloped. The prospect is that in a few generations the civilized white will be edentulous. Underweight children seem to suffer especially from caries, malocclusion and pathological gums. Next to defects of vision, defective teeth was the most common cause for rejection in the late draft. National and State programs for the conservation of the teeth are under way or soon will be in England, New Zealand, New York, Tennessee and West Virginia. There are also similar movements in some cities and in Bridgeport it is estimated that the amount of caries has been reduced 50 per cent, with the prospect that the percentage will reach 70 or 80. But this concerted attempt to secure mouth hygiene has an even greater function for it has been shown in Bridgeport that the incidence of contagious diseases of childhood has been greatly reduced, showing that a dirty mouth favors the breeding of ordinary disease germs. The author mentions the claims of Cotton of Trenton that in the State Insane Asylum many cases of insanity have been benefited by abolishing infected tonsils, tooth roots and similar structures which harbor germs.

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EDITORIALS

Extraction versus Expansion

A PAPER by G. F. C. Matthews, L.D.S., read before the British Society for the Study of Orthodontics, is published in this issue of the International Journal of Orthodontia and Oral Surgery, under the title of "Practical Results in the Treatment of Malocclusion." Mr. Matthews mentions the desirability of correcting deformities by expansion of the dental arches, and he also took a decided stand against the "perniciously ignorant practice of extraction." We are in accord with Mr. Matthews' ideas, as advocated in this paper, but which methods seem to have aroused considerable criticism from Doctor Sim Wallace. We are at a loss to understand some of the statements and interpretations made by Doctor Wallace. From his discussion of Mr. Matthews' paper, we would surmise that Doctor Wallace is not aware of the possibilities of expanding the dental arch, particularly in the lateral direction. He makes the statement in his discussion that "expansion was always forward, one cannot get so much room by doing it breadthways." From that interpretation

of expansion, we are forced to believe that Doctor Sim Wallace has been unfortunate in examining cases of malocclusion in which attempts were made to expand, with the result that lateral expansion was not obtained, and the teeth were only moved forward.

Dr. Wallace also states that instead of expanding the dental arch, extraction must be resorted to in many cases in order to obtain room for the teeth. We are aware that the case cited by him, in which the incisors were carried forward, producing a long narrow arch was beyond doubt, an error of treatment such as we have seen in this country but one which cannot be taken as an example of the type of expansion as advocated by Mr. Matthews, and widely practiced by many other men.

We are willing to agree to Doctor Wallace's statement that extraction is necessary in some cases, and may be an advantage towards securing an efficient result in a short period of time. But that type of cases does not include those malocclusions in which expansion is the particular thing required. Even the most enthusiastic advocates of extraction would not advocate extraction of teeth as a means of making room in the dental arch in those cases of malocclusion requiring lateral expansion, and furthermore, we would state that the amount of lateral expansion that can be obtained is only limited by the technical ability of a man doing the work. Therefore, extraction as a substitute for expansion is a thing never to be considered.

Orthodontic Directory of America*

SEVERAL attempts have been made to compile a list of orthodontists. Some have been made by individuals for their own personal use, while others have been made by dental supply houses interested in orthodontic appliances. However, some of the information desired by the average man was not available, and the Orthodontic Directory of America fills a long-felt need. We believe this is the first attempt to make a directory of a group of specialists in dentistry.

Besides listing the names under the different states, an endeavor has been made to give information relative to the exclusive practice of orthodontia, time of receiving dental degree, and the school from which postgraduate instruction was obtained. An effort was also made to designate those who were members of the American Society of Orthodontists.

The editor of the directory tried to have every person whose name he obtained from various lists in his possession supply personal information, but the effort was only partially successful. This accounts for the fact that no information appears after some names, also for the errors in some of the street addresses. There are a few mistakes in proofreading, which can be corrected in the second edition.

As a whole the directory is very valuable and is practically indispensable to any one interested in orthodontia.

**Orthodontic Directory of America.* Edited and published by Dr. William C. Fisher, 501 Fifth Ave., New York City.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

British Society for the Study of Orthodontics

A meeting of the British Society for the Study of Orthodontics was held at 11, Chandos Street, Cavendish Square, W., on Wednesday, February 9th. 1921, Mr. J. Lewin Payne, President, in the chair.

The minutes of the previous meeting were read and confirmed.

The following newly-elected members, who were present for the first time, signed the Obligation Book: Messrs. J. K. Grayson and L. J. Byron.

Election of Candidates.—A ballot was taken, and Messrs. Eric N. Commander, L.D.S. (Glas.), of 11, Crosbie Road, Birmingham, and Wm. Jones, L.D.S. (Eng. and Edin.), of 2, Colosseum Terrace, N.W.1, were duly elected.

The following visitors were present: Messrs. Berry, du Toit, Ransford, Gardner, Commander, Wilshire and Parker.

Casual Communication.—Mr. Maxwell Stephens read a Casual Communication on a case of Lip-Sucking, which was illustrated by models, etc. (appears on p. 504).

The following paper was then read by Mr. Cale Matthews, *Thoughts on Orthodontic Teaching* (appears on p. 490).

The President said it only remained for him, in the name of all present, to thank Mr. Maxwell Stephens for his Casual Communication, Mr. Cale Matthews for his paper, and also all those gentlemen who had taken part in the discussion, and announced that the next meeting would be held on Wednesday, March 9th.

Notes of Interest

Dr. C. M. McCauley announces the removal of his office from Dallas, Texas, to 305 Chapman Building, Los Angeles, California.

Dr. A. Friedman announces the removal of his office from San Francisco, Calif., to 906 Story Building, Los Angeles, Calif.

Dr. R. M. Moore, of Cedar Rapids, Iowa, announces the removal of his office to 300 S. Linn St., Iowa City, Iowa.

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ORIGINAL ARTICLES

MALNUTRITION AND LACK OF FUNCTION AS IMPORTANT CAUSES OF MALOCCLUSION*

BY S. E. JOHNSTON, D.D.S., PH.G., KANSAS CITY, MO.

IT has been wisely said that if we want a normal healthy child we should begin two generations back.

In stock breeding, we know the importance of choosing well developed animals to breed from. In our human relationships we very largely ignore these facts. This is necessarily true because all who are above an idiot in mentality may marry and beget children.

This places on the human family a large hereditary handicap. Important as hereditary consideration may be I am sure that feeding and environment are equally important.

Every epoch has its problems and I believe that dietetics is coming to the front today. Too large a percentage of us have seemed to think that we could filter through these bodies of ours any concoction or conglomeration that we can cultivate a taste for and still maintain health. For one hundred and fifty years germs have been studied as a causative factor in certain diseases. For almost fifty years the medical profession has accepted the germ theory of disease and treatment has been based on this conclusion.

Seemingly we have made some progress. There are specific remedies for diphtheria and typhoid fever. We have learned how to prevent yellow fever and many other diseases. But a look into our hospitals, alms-houses and asylums, which are all full to over-flowing, raises the question, how far have we gone in the control of disease?

Dr. Percy R. Howe, writing about the focal theory of infection in its application to the teeth, in the *National Dental Journal*, says:

*Read before the Alumni Society of the International School of Orthodontia, Kansas City, Mo., July 14, 1921.

"We are at present suffering from a professional neurasthenia. Every mole hill seems a mountain. We eliminate all other factors, such as normal living, a good sane diet, rest, fresh air, nervous disturbance, high tension living, and see only the infections.

"Let us hope that dentistry will maintain its sense of proportion, its equilibrium, and let us take a sound, broad and comprehensive view of the problems of physiology and of disease before the present ruthless sacrifice of teeth extends further."

There is another theory of disease, namely, autointoxication or food poisoning; in other words ptomaines or toxins developed in the body from undigested food. The food may have been pure and wholesome when taken, and most likely was, but was taken in excess of the digestive capacity at the time. This excess food simply spoils in the body the same as it would if kept on the pantry shelf at a temperature of 98½ degrees.

This theory holds that we build most of our diseases by over-working one organ or another by the use of an unbalanced diet or improper care of our bodies, often by the abuse of our body functions.

One of the great mysteries of life is the power of growth, that harmonious development of composite organs and tissues from simple protoplasmic cells, with the ultimate formation of a complex organism with its orderly adjustment of structure and function.

Equally mysterious is that wonderful power of rehabilitation by which the cells of the body are able to renew their living substance and to maintain their ceaseless activity through the period of a life time. That life time may be four score years or more. With these facts in mind do we not see the importance of food in sustaining life?

Without air, life is a matter of but a few minutes.

Without water, a few hours.

Without food, but a few days.

Dr. Tanner fasted forty days and came back to normal health. I think that is the best scientific fast we have recorded.

In the life and growth of the child food is even more important than in the adult. The adult simply requires food to replace tissue waste and supply energy for work. The child in addition must have food with proper materials to build new bone, muscle, blood and brain.

Bosc relates that the mortality among the infants in the public hospital at Tours has always been high, reaching 50 per cent in 1916, notwithstanding that the healthier children were boarded out in the country to be brought up on the bottle.

In 1916 new regulations were put into effect so that every woman delivered in the maternity was compelled to remain and nurse her child for three months. No applicant was received at the maternity unless she consented to stay afterward for three months. During this period her board and lodging is free and she is paid about twenty-five cents a day. She is thus the paid wet nurse for her own child. This is kept up as long as she will stay and nurse the child.

Since this regulation went into effect, 264 patients have been detained in this

way and the mortality among the infants has dropped from 50 per cent to 2.7 per cent.

There is no question but that nursing the breast is the normal way to feed the child. Modified cow's milk is the next best food, but the nursing bottle does not function like the breast.

Malocclusion is the result of a lack of bone development at the proper time.

As the time approaches for the eruption of the permanent teeth the maxillary bones and especially the alveolar process of the maxillary bones must develop fast enough to accommodate those teeth. If during the earlier life of the child there has been a period of arrested development it will show when the permanent teeth erupt.

At five years of age the crowns of the centrals, laterals, first molars, and canines are calcified beyond their widest part, therefore any arrested development of the child cannot affect the size of those teeth after that age.

Clinical observation bears out the statement that it requires a very severe disturbance of metabolism to affect the teeth but the development of the alveolar tissue seems to be rather easily arrested. This arrested development is the cause of malocclusion. Air and water, food and exercise in normal quantities and supplied in normal ways are necessary to normal growth.

The food must furnish all the elements for tissue building.

For some years we have been taught that the white flour did not contain the digestive ferments which are in the whole wheat; also that in peeling the potato we remove these same digestive ferments.

Later we have discovered another element that has been removed by this same process; namely, the vitamins. These are claimed to be the most vital element in tissue building. Without the vitamins in proper proportion in our food we cannot have normal health and growth.

Think for a moment what a large place bread and potatoes have in our diet. Then think again that as bread and potatoes are served on our tables nine times out of ten they are devoid of these vital elements. Whole wheat or graham flour should be used for bread. The potato should be baked and the whole potato eaten. The digestive ferments and vitamins are so close to the skin that they are lost in any other way of preparation.

LACK OF FUNCTION

I have called attention to the reduction of mortality in the maternity hospital at Tours by having babies breast fed. I want you now to consider the effect upon the development of the infant's maxillary bones in nursing from the breast, compared with drinking from a rubber tube or nipple. I have not gathered data from all my cases but from what I have, I find that a majority of them have been artificially fed or had only a few weeks of nursing at the breast.

Take this bit of scientific knowledge which I quote from a paper written by Dr. E. A. Bogue of New York City:

"Dr. Lawrence Baker of Boston ground off the teeth on one side of the mouth of several young rabbits and kept them ground off until they reached adult life, when the whole litter was killed and their skulls examined, with the

result that the left side of those skulls which had been deprived on the right of their masticating function were larger than the mutilated sides; the capacity of the brain box was greater and the general well-being of the animal was more marked upon the side where function had been properly performed than upon the mutilated side.

"This series of experiments found confirmation a short time afterwards in a series of experiments made in the University of Berlin by Landsberger on some puppies from a number of which he took the germs of the teeth on one side of the mouth so as to effectually inhibit the performance of function on that side, and the same results as were found by Dr. Baker in Boston occurred with him. The mutilated side where function was not performed was smaller when compared with the uninjured animals. It is, of course, impossible to prove that greater brain capacity would be any better in any individual case, but we may infer considerable along these lines."

If the deciduous set of teeth is not kept in health so that the child can perform the function of mastication in comfort he will not masticate his food.

How often have you upon examination of a mouth realized that it was impossible for the patient to masticate anything on one side of the mouth without causing pain?

How thoroughly would you masticate your food under those conditions?

What would you expect of a child?

We know that if a child cannot perform the function of mastication in comfort, he will swallow his food without mastication.

In closing let me repeat that malnutrition and lack of function are not only important causes of malocclusion, but, placed together, they are the most important cause.

DIRECT METHODS OF MAKING MOLAR BANDS*

BY HERBERT A. PULLEN, D.M.D., BUFFALO, N. Y.

STANDARDIZATION OF MATERIALS

THE materials used for the molar bands for anchorage for either labial or lingual arch should be so standardized that there is not such a wide variation in these materials in use all over the country as there is at the present time.

For example, the band material should be of gold and platinum which has a good edge strength and yet which can be easily burnished to the teeth. Pure gold is absolutely too soft, and even coin gold is not so desirable as a gold and platinum band material which has a higher fusing point.

QUALIFICATIONS OF BAND MATERIAL

The following qualities should be found in a good band material: 1. High fusing point; 2. Noncorrosive and nonoxidizing; 3. Good edge strength; 4. Capable of being easily burnished to the teeth.

1. *High Fusing Point.*—A high fusing point is needed to secure safety in soldering operations. Many of the samples of band material which have been placed on the market have been of a low fusing point, and this band material would often fuse before the solder, thus ruining the band. However, the best known manufacturers now furnish gold and platinum band material of a high fusing point. Iridioplatinum has the highest fusing point, and possesses all of the qualities of a good band material, but its cost is prohibitive for general use.

2. *Noncorrosive Materials.*—The use of the highly corroding and oxidizing German silver band material is on the wane, although there is still a large amount of this material used by those who do not understand the handicap they are under in its use. Gold and platinum band material will not corrode, and will not oxidize unless too much base metal is alloyed with it.

3. *Edge Strength.*—Edge strength is important and without it band material will continually bend instead of holding its shape while being forced between the teeth. Gold and platinum with a small percentage of silver and copper to give hardness, produces a band material of splendid edge strength.

4. *Burnishing Qualities.*—A band material which does not readily burnish to the teeth will spring away and will never perfectly fit the circumference of the molar. It is possible to obtain this quality combined with good edge strength in the best band material.

WIDTH AND THICKNESS OF BAND MATERIAL

Molar bands should be made of gold and platinum band material .007" thick and .20" wide for permanent molars. A slightly thinner band material may be used for temporary molars.

*Clinic before The American Society of Orthodontists, Atlantic City, April 30, 1921.

METHODS OF MAKING MOLAR BANDS

There have been two distinct methods of making plain bands for molars, the *indirect* and the *direct* methods.

The *indirect method* is one in which the molar band is made upon a plaster reproduction or a metal die of the tooth, all of the fitting and contouring being done in the laboratory, thus saving the operating time at the chair, although increasing the amount of work in the laboratory over the direct method.

DIRECT METHOD OF MAKING MOLAR BANDS

With the *direct method* the molar bands are fitted directly to the teeth in the mouth, and perfectly finished and contoured at the chair, an impression being

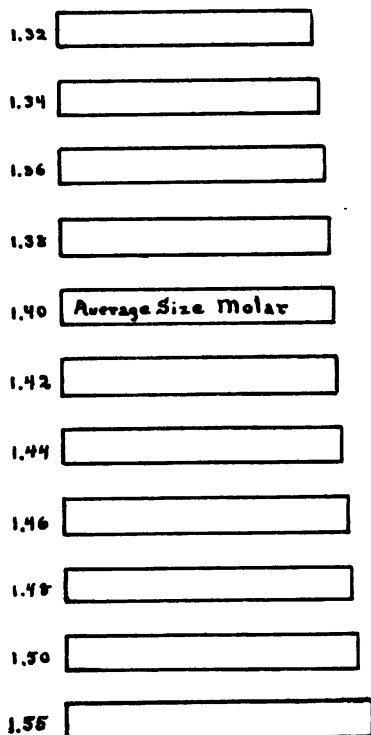


Fig. 1.

then taken with these bands in place, the bands replaced in the impression and an investment cast poured, all appliance attachments being made upon this investment cast in the laboratory. With an adequate supply of graduated sizes of maxillary and mandibular molar bands made up in stock, the minimum amount of time is consumed both at the chair and in the laboratory, especially if a technic, simplified to the last detail, is followed.

The writer has used the direct method to a considerable extent and has developed a simplified technic which may be described in sequence as follows:

GRADUATED LENGTHS OF BAND MATERIAL

The band material is cut as shown in Fig. 1, into eleven different lengths for the various sizes of permanent molars found, ten of these varying each .02"

in length from 1.32" to 1.50" for either maxillary or mandibular molars. An especially long one is made 1.55" in length for unusually large molars. The bands are usually made up in pairs of the same length, as the molars on each side of the mouth are identical in size. It will be found also that the circumference of each of the four first permanent molars is the same, again simplifying the construction of the bands through the uniformity of sizes of the bands, although the flare of the bands for mandibular molars is considerably greater than for maxillary molars, which is prepared for by cutting deeper end angles on the mandibular molar bands than on the maxillary. It is possible to make up maxillary and mandibular molar bands with predetermined end angles for the average molars as will be shown.

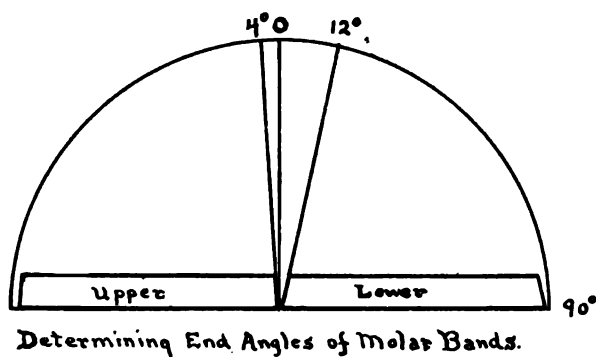


Fig. 2.



Fig. 3.



Fig. 5.

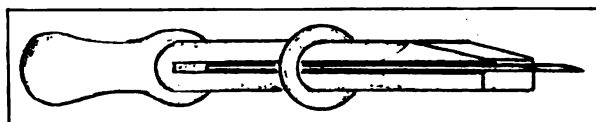


Fig. 4.

DETERMINING END ANGLES OF CUT BANDS

The ends of these cut bands should be trimmed to definite angles, Fig. 2, for maxillary and mandibular molar bands, the maxillary bands being cut to a 4° angle and the mandibular bands to a 12° angle, these angles giving the proper flare to the finished bands for the average molar teeth, both maxillary and mandibular.

BEVELING ENDS OF BAND MATERIAL

The ends of each length of band material are next beveled as in Fig. 3 so that when lapped, the joint will be a smooth one, and partially invisible.

The writer has adapted a jeweler's clamp, Fig. 4, to hold the band material rigidly so that the proper bevel may be made with a gold file, following the bevel on the end of the clamp.

BENDING BAND MATERIAL IN A CIRCLE

The beveled band lengths should be bent in a circle until the bevels overlap as in Fig. 5, and the writer has devised a plier, the beaks of which appear as in Fig. 5, to quickly bend the band lengths into circular form.

SOLDERING LAPPED JOINT

By fluxing the lapped joint and holding the band in a soldering clamp in the blowpipe flame, touching the joint with a piece of 18 to 22 K wire solder at the

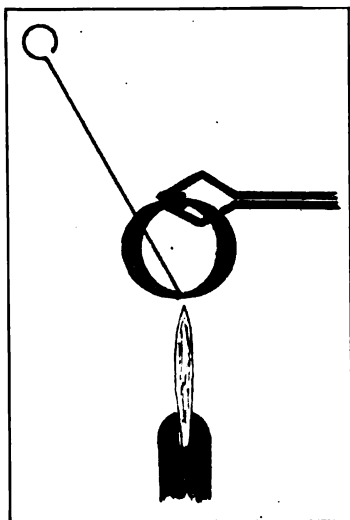


Fig. 6.

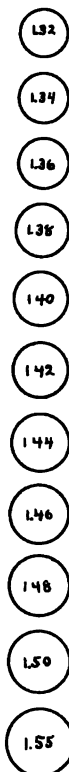


Fig. 7.

proper time, as illustrated in Fig. 6, will fuse the solder in the lapped joint when the band will be ready for trimming and contouring. The series in pairs of either maxillary or mandibular bands from 1.32" to 1.55", as shown singly in Fig. 7, may now be placed in small consecutively adjacent compartments in the cabinet designed for them, from which they may be selected to fit the various sizes of molars, and trimmed and contoured after such selection.

SELECTING PROPER SIZES OF MOLAR BANDS

The average first permanent molar is 1.40" in circumference, this measure holding good for all four first molars, hence this size and the nearest approxi-

making sizes, 1.38 and 1.42, will the most often be used from the made up stock and will have to be replaced more frequently. It is best to select the 1.40" band first and slip it over the crown of one first molar and if it is too large try a band a size or two smaller, or if too small try a size or two larger.

A little experience will enable one to determine the proper size almost at a glance.

FITTING BANDS TO MOLAR TEETH

When the proper size of band is found, it should be flattened slightly mesially and distally with the flat nose pliers, and placed with soldered joint

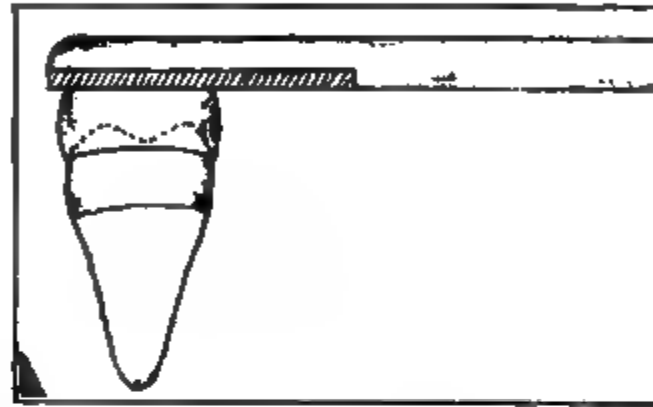


Fig. 8.

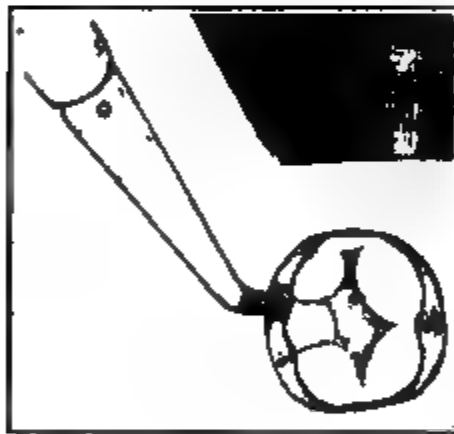


Fig. 9



Fig. 10

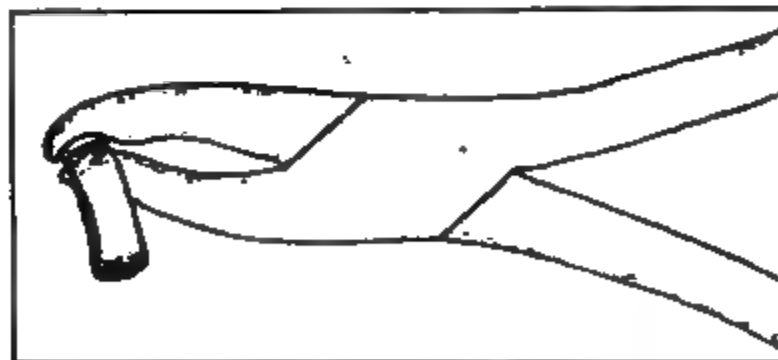


Fig. 11.

buccally over the crown of the molar, and with the band setting instrument should be forced between the proximate contacts of adjoining teeth, and rocked into place as far as the gingivæ as illustrated in Fig. 8. The writer uses an all metal band setter with a piece of pure tin soldered on the end as in Fig. 8 to catch the edge of the molar band and prevent slipping.

TRIMMING AND CONTOURING THE BANDS

While the molar band is in this position, it can be noticed whether it impinges upon the gum tissue mesially or distally and if so, it can be trimmed to relieve this impingement at once. The band should then be replaced upon the tooth, and burnished into all of the buccal and lingual grooves, with the serrated burnisher designed by Dr. J. Lowe Young, as illustrated in Fig. 9.

At no point should the band be allowed to cover over the occlusal surface of the molar as occlusion upon such overlapping edges wears away the cement and leaves a lodging place for food and detritus.

BAND REMOVING AND CONTOURING PLIERS

The band should next be removed with the band removing plier, Fig. 10, a design of the writer's, and contoured buccally and lingually with a special

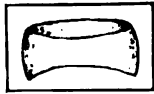


Fig. 12.

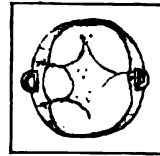


Fig. 13.

contouring plier, Fig. 11. The finished band, trimmed and contoured, should appear as in Fig. 12.

ANCHORAGE ATTACHMENTS

If the lingual or buccal arch is to be constructed upon these bands, the half round tubes should be soldered, as in Fig. 13, buccally and lingually, before the band is replaced upon the molar, so that these attachments will be in readiness in case either or both lingual and buccal arches are desired.

SEAMLESS BANDS

Seamless bands made in the same sequence of sizes and forms, partially contoured for maxillary and mandibular molars, would save considerable time in the following out of the technic in the direct method of fitting molar bands at the chair, and it is to be hoped that the manufacturers of band materials will not long delay the promised production of such ready made bands for the improvement of the technic.

PREVENTIVE ORTHODONTIA*

BY C. M. McCAULEY, B.S., D.D.S., LOS ANGELES, CAL.

IN QUITE recent years the most familiar phrase among doctors was "remove the cause." Present day thought of the most advanced minds devoted to the healing art is toward prevention. Instead of waiting for a cause to produce a condition, and then treat the condition, the predominant idea is to discover the cause upon its appearance and remove it, thus preventing the condition. In preventive orthodontia one may go a step further. The etiologic factors which combine to bring about what is looked upon as the direct cause of many cases of malocclusion may often be obliterated before the visible cause appears in sight. That it is better to prevent than to cure, no one will question.

There are two outstanding reasons why preventive orthodontia should appeal most strongly to the consideration of all persons interested in prevention of general diseases:

1. Because of the vast importance to the general health and appearance of the individual. A large percentage of nose, throat, and sinus trouble would never occur. Caries of temporary teeth would be greatly diminished. Permanent teeth would be more immune to disease and mastication would be better performed. Better digestion and assimilation, and all the good things which result therefrom, would be ours. Pyorrhea of later years would be greatly diminished. Alveolar abscess and all its dreadful sequelæ would be lessened. The opsonic index would be kept higher and many childhood diseases of extra-oral origin would be avoided.

2. Because we know what the etiologic factors are in a majority of cases. They are of such a nature that we may see them before they actually become visible to the eye. They can always be detected when they appear and in many cases before. Yes, these causative factors may be known to the close observer oftentimes several years before the actual deformity appears. All of which makes it less excusable to leave them unobserved while Nature has tried in the face of too many difficulties to produce a good denture and failed.

Preventive orthodontia may be considered the basis of all prevention because it seeks to build perfect dentures, and perfect dentures are necessary to perfect digestion and assimilation. Besides that, when basic prevention is truly accomplished and a perfect denture completed, the mouth as a center of focal infection will be practically eliminated, and the nose and throat as factors in focal infection will be greatly reduced. The growth and development of the mouth and its tissues are so closely associated with the growth and development of the nasal passages and their tissues that the obstructions to normal processes originating in either organ will cause trouble in the other.

*Read before the Alumni of the International School of Orthodontia, Kansas City, July 14, 1921.

MORE MODERN CONCEPTION OF ORTHODONTIA

This specialty, in the earlier years of its existence, sought only to straighten crooked teeth and place them in alignment. In later years it embraced the science of occlusion. Advanced orthodontia of the present day covers not only the correct alignment of teeth in their arches, in a manner known as normal occlusion, but it seeks also to establish normal proportions in facial outline and to produce harmony in all facial features which owe their origin to dentofacial relations.

The orthodontist who has a true vision of the scope of his work, who sees the many factors in its etiology and appreciates the benefits to his patient made possible by inhibiting the action of or removing these factors, cannot avoid a deep feeling of responsibility to those who submit their cases to his judgment. Preventive orthodontia has many phases and will cover a larger field of work than that formerly done by orthodontists but its reward will also be greater. The patient who receives proper attention in this line of prevention will build an adequate foundation upon which the whole structure of health will rest, and it is difficult to conceive the great number of blessings resulting.

Normal development and prevention in orthodontia work side by side. Natural processes preside over normal development and when these processes fail it is the duty of the orthodontist to come to the rescue immediately when this failure occurs in tooth development, and render assistance. Such failures on the part of Nature in building the denture are due to pathological conditions. It therefore becomes the duty of the orthodontist to know or to learn when normal growth ceases and pathologic processes commence. In order to so differentiate he must be able to recognize the normal as well as the abnormal.

NORMAL DEVELOPMENT

Normal development of the denture depends primarily upon proper development of the individual. Also the proper functioning of the denture has great bearing upon general development. Primarily the development of the individual depends upon nutrition, environment and inheritance. Normal development is normal growth plus the organization of tissues to meet the demand of special function. Such development would be the result in all cases were it not for antagonizing forces from disease or malnutrition which interfere with normal denture building. This interference becomes stronger in its efforts to abort the processes of growth than are those forces of Nature which are trying to produce a perfect denture. When this happens, distortion and maldevelopment are the result. The purpose of preventive orthodontia is to recognize these antagonizing forces as soon as they appear and by artificial means supply the necessary stimulus to assist Nature in overcoming them.

SOME CONDITIONS ACCOMPANYING NORMAL DEVELOPMENT OF TEETH

Some of the physical forces which direct the teeth into correctly formed arches are the following:

1. The tongue and muscles of deglutition which influence the shape and curvature of the arches by outward pressure.

2. The muscles and cheeks which exert a pressure in the opposite direction from that of the tongue, thus establishing an area of equilibrium into which the teeth are at liberty to go.

3. The mouth closed and lips together, the lower lip overlapping the maxillary anterior teeth.

4. Well ventilated nasal passages for free passage of air.

5. Growth of the teeth and surrounding tissues in occlusal, forward and outward directions.

6. Long cusps and inclined planes of deciduous teeth which will develop the arches laterally if vigorous use is made of the teeth during mastication.

From the foregoing we may deduce the following along preventive lines:

1. Proper diet to influence normal growth. This applies not only to the child after birth, but to the mother before birth, and while nursing the child. The percentage of bottle fed babies who develop malocclusion is considerably larger than that of babies fed on human milk. Many cases of malocclusion due to malnutrition may be prevented by correct diet.

2. If deficiency in size of the jaw bone has resulted from errors in development, there will not be sufficient space for normal eruption of permanent teeth, and the result will be a crowded and irregular denture. When the permanent anterior teeth erupt normally, they appear in the arch in their right positions. About two years before eruption their growth begins to cause enlargement of the dental arches as shown by the spaces which appear between the anterior deciduous teeth. This enlargement is facilitated by the permanent teeth maintaining their right positions, with their longest diameters in the line of the arch. In other words if they do not maintain their right positions before and during eruption and stimulate the growth of bone as they should, some additional force is necessary. If the spacing fails to appear between the deciduous teeth at the proper time, namely between the fourth and sixth year, the case should be examined with the x-ray and if the permanent teeth are found to be crowded and irregular, treatment should be started at once. At this stage, treatment is usually more simple and easy than at any future time. Only slight pressure upon the lingual surfaces sufficient to stimulate the tissues slightly will cause the arches to widen and provide room for permanent teeth to erupt. This force may be applied with a small lingual bar or with any device which will apply the force in the right way. Oftentimes the maxillary arch will not require any attention as the expansion of the mandibular will expand the maxillary by means of the cuspal inclined planes in occlusion. It is possible to prevent serious cases of neutroclusion by this simple procedure if the case is discovered in time.

3. Hyperplasia of lymphoid tissue in the nasopharynx which closes the nasal passages and forces the mouth open for breathing, lays the foundation

at a very early age for malocclusion. These patients should have attention as early as possible, not later, however, than the fourth year. Proper treatment of such conditions administered early enough would prevent much trouble in later years.

4. All malocclusion resulting from loss of deciduous teeth from caries could be prevented if the child had proper attention at the right time. Caries may occur at any time after the eruption of the deciduous teeth. Therefore the age of prevention would begin at the time of eruption of these teeth. Surely four years of age is not too early to begin efforts to prevent caries. There is too great a tendency among the laity to neglect the first teeth of the children because they are regarded of little value. They are only deciduous according to their view point and will be lost in a few years any way. No need to have one filled because the filling will also be lost when the tooth goes. As a matter of fact, when the health of the child is considered, and the deciduous teeth are valued at their real worth as a factor in the foundation for future health of the individual, the deciduous denture is worth as much if not more than the permanent. Not only should each tooth be retained in its place until the proper time for its shedding, but each contact point should be maintained with utmost care. The matter of keeping the temporary denture intact and perfect in its function is one of the most important phases of preventive orthodontia.

We know the cause of a great many cases of malocclusion. There is no question about the cause in a multitude of cases. These causes can be removed or prevented if we only get the cases in time and handle them intelligently. If our literature contained more about ways and means of securing our patients earlier, about detecting deformities before they come into view from eruption of the second teeth and suggesting methods of preventive procedure at the right time, it would tend toward the elevation of the already high standard of the specialty. We take up too much space discussing appliances in our literature. Of course we must have appliances, but there is too much said about them to the exclusion of other things of importance. My experience with appliances has taught me that teeth are moved by a combination of appliance and personal element in the operator. The difference in the personal element tells us why one man gets results with one appliance and another man gets equally good results with an entirely different appliance. Each operator should use the appliance which, in combination with the personal element within him, secures the best results with the case in hand. Different movements of teeth require different methods of applying force, which fact makes it wise to use a different appliance when indicated. In the judgment of the writer it would be a good thing for our national society, or societies, to devote a meeting to discussions of preventive procedure, outlining the scope of the orthodontist's work as regards prevention. It is quite probable that such a meeting would change the character of our programs for the future.

CONCLUSION

A very large percentage of cases of malocclusion is the result of interference with Nature's processes of development at a time when orthodontia could render the assistance necessary to prevent the disorder. To do this successfully we should have our patients at a younger age than we are getting them now. Suppose we make an effort to secure the child for examination before the fourth birthday and if an abnormality is seen correct it or see that it is corrected, then watch the case at frequent and regular intervals thereafter until the permanent denture is correctly completed. If there is caries have it arrested. If there is loss of normal contact in temporary teeth have it restored. If prophylaxis is needed, see that it is provided. If movement of teeth is needed, do it now.

HISTORY OF ORTHODONTIA

(Continued from page 269.)

BY BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY

SIMION H. GUILFORD, A.M., Ph.D., D.D.S., 1841-1919.—In the first edition of the *American System of Dentistry* published in 1887, *Guilford* prepared the chapter on *Orthodontia*, pages 305-358. This article treated the subject more comprehensively than had yet been done by any author in this country, excepting *Kingsley* and *Farrar's*, whose work appeared the preceding year. Full descriptions were given of the various systems of correcting irregularities of the teeth, which had been brought to the attention of the profession by vari-

Fig 1 — Simon H. Guilford. (1841-1919.)

ous men as well as some appliance original with *Guilford*, the article being illustrated with fifty-eight cuts and described in detail. "It also contained a formulated set of rules governing the application of force, and another set by which to determine whether or not extraction should be resorted to in cases presented for treatment."

Guilford's first edition of *Orthodontia* was published in 1889, at the request of the National Association of Dental Faculties, to be used as a text book

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in the schools of the Association. It was written for the student and not the practitioner, and with that in view the matter was arranged in progressive form, leading from the simplest beginnings up to the practical treatment of the most difficult cases. This was the first text book for students upon the subject of *Orthodontia* published, successive editions followed in 1893, 1898, 1905. Also transcribed in French and Spanish.

In the above chapter relating to orthodontia, *Guilford* states: "The teeth of man when in their normal position are arrayed in symmetrical order, side by side, their outline as a whole describing very nearly a parabola or semi-ellipse, their variation from these geometrical figures consisting principally in a slight flattening in the region of the incisor teeth, and a tendency to angularity in the region of the cuspids, owing to the marked prominence of these teeth.

"While this arrangement is generally regarded as normal and most in harmony with agreeable expression, it is nevertheless slightly variable in regard to the various national types, some having the outlines of the curve more flattened and angular, while others approach more nearly to the true parabolic curve.

"Whatever the national type, however, in respect to outline, the teeth, to be normally situated, must occupy their respective and regular position of this line. Any deviation from this constitutes what is known in dental science as an irregularity.

"Dental irregularities are usually of two general kinds: one, where certain individual teeth (one or many) stand out of line or are improperly placed in line, but where those still in place describe the normal outline of the particular jaw; the other, where the teeth all stand in line, but where their outline is so changed from a normal standard as to constitute a deformity or malformation. Either of these or a combination of the two is what generally calls for the interference of the dental practitioner.

"Irregularities, as to their origin, may be either *hereditary* or *acquired*, the one resulting from causes operating before the birth of the individual or the eruption of the teeth, and the other from circumstances attending their eruption or subsequent to it. * * *

"Whether the deviations from a normal standard, both in regard to the shape of the arch and the arrangement of the teeth in line, are more frequent now than formerly is an unsettled question in the minds of many; but certain it is that the subject of the correction of such deformities is steadily growing in importance and attracting an amount of attention that was formerly unknown. In the early days of the dental profession but little attention was given to this subject, both from its then seeming unimportance and from the great difficulties that attended its accomplishment, owing to the crude character and limited number of appliances then at command for dealing with it.

"Today, however, with the better knowledge of the character of the lesion and the multiplication and perfection of appliances, added to a greater facility of adapting the means to the end, the correction of irregularities has been greatly simplified, and with the means now at our command we are not only

able to bring about almost any desired change in the dental organism, but also to prognosticate our success with comparative certainty.

"Closely related, however, to the possibility of accomplishment is the advisability of it under certain circumstances; and in the determining of this, our action will necessarily have to be governed by certain attending conditions.

"Prominent among these are the age, sex, condition of life, health, family type, etc., of the patient. What may be the proper course to pursue under certain circumstances might be the improper one under other circumstances, and what may be advisable or expedient in one case might be totally inexpedient in another.

"Thus, in considering the question of the age at which the correction of an irregularity should be undertaken, we have to be governed largely by the character of the operation required. An operation might be undertaken very early in life of so extensive a character as to very severely tax the vital powers at a time when there is no life-force to spare, and where the results, if attained, would be hard if not impossible to retain. The same operation, delayed until a later period, when health and strength are better established, might not only be more easily accomplished, but attained with better results.

"So, too, an operation delayed too long may become associated with complications and difficulties that would have been avoided had it been undertaken earlier, when the treatment, in the nature of the case, would have had the element of prevention linked with it.

"The correction of irregularity can usually be begun and accomplished at any time between the eruption of the teeth and late in life, but the judgment of the operator will have to be exercised to determine at just what period of life it would be best to undertake it.

"Should the surrounding conditions favor it, the earlier the correction is taken, the better it will be in most cases. The bony tissues of the socket are then in their most pliable condition, making the labor easier and the time shorter; and the foramina for the entrance of the nutrient vessels being then quite large, there will be less liability to trouble from strangulation of the pulp and its consequent devitalization. The old rule that once prevailed of not beginning to correct an irregularity until all the permanent teeth were in place, for fear that the later arrivals by their crowding or pressure would disarrange those that had been brought into place, is now, we think, generally considered obsolete. True, such things may happen and have happened, but it is equally true that such a result may easily be prevented by the exercise of judicious care and watchfulness.

"Many years of attention to this subject, aided by a large experience, have firmly convinced the writer that wisdom and prudence alike dictate early interference in cases of irregularity. By this we would not be understood to mean meddlesome interference, for certainly such a thing is possible.

"There is a law of Nature tending strongly to harmony, and when accident or unusual circumstances bring about an irregularity in the dental arch, Nature will do all in her power to combat the opposing influences and bring about harmony. To enable her to do this it is necessary that she have time to accom-

plish it, and occasionally a little assistance from the dentist. Judicious interference is right and proper, but meddlesome interference will often only accomplish that which a little later Nature would have accomplished unaided.

"For instance, during the eruption of the permanent incisors, both superior and inferior (especially the latter), there often appears a slight irregularity. In most cases Nature by her strong inherent powers will correct this condition if time be allowed her; and it is certainly better in every respect, to allow her to do so than for us to unwisely interfere in the matter.

"So, too, a tooth is very often forced out of position or kept out by another tooth of less importance partly occupying its place. Nature alone cannot correct this condition of affairs, but if we aid her by removing the obstructing tooth she will in most cases, unaided (if the patient be young), bring the malposed tooth into line. * * *

"The surgery of the mouth, in the very nature of the case, is associated with many difficulties not met with in operating upon other portions of the human frame. Could we, like the general surgeon, perform our work heroically and at once by laying open the part, removing such tissue as we wish displaced, move the organs into the desired positions, fasten them there and bind up the part to give it rest and await the favorable action of Nature's recuperation, our labor would be greatly lessened. Such favorable conditions, however, are not vouchsafed us.

"Operations for the correction of irregularity must be slow and gradual in their character: instead of removing tissue that stands in our way, we must depend upon Nature to remove it by her slow method of absorption under the stimulus of pressure; the individual organs whose position we desire to alter are deeply and solidly implanted in a strong bony structure, and, aside from the mechanical difficulty of moving them, we must exercise the greatest care, for they are tender organs, and sudden violence offered them may easily result in their devitalization and possible loss; the pressure exerted to bring about the change we desire must be positive in its character, and continuous as well, and the appliance employed must not only be strong, but neat in character and occupy little space, so as not to interfere with neighboring organs. More than this, they must meet the hygienic conditions of the cavity in which they are placed by being made of such substances as shall not exert a deleterious influence upon the oral fluids and the stomach, nor yet rest unduly upon or irritate the soft tissues surrounding them, and thus bring on a morbid condition." * * *

Guilford's formulated rules governing the application of force were described as the following:

"In bringing malposed teeth into their proper places, certain movements must take place and proper forces be applied to bring about these movements. The movements generally required are either outward, inward, forward, backward, rotary, or general expansion, sometimes a combination of two or more of them being required. To cause these movements we must bring to bear forces sufficient to accomplish them; and this we do through the medium of such mechanical appliances as seem best to serve our purposes:

*"According to well-known physical laws, the greatest good can be obtained from any force only when it is exerted in a direct line with the movement desired. * * **

*"The force applied must be sufficient, but it should not be more than sufficient nor too abruptly applied. * * **

*"The point of resistance and the point of delivery of the force must be fixed points. * * **

*"The resistance at the point from which we exert pressure must be greater than the resistance to be overcome by the pressure. * * **

*"Before applying force it should be seen to that there is space sufficient to accommodate the tooth in the new position it is to occupy. * * **

*"Pressure may be either constant or interrupted. * * **

"Pressure should be exerted as nearly as possible in a line at right angles to the long axis of the tooth."

Guilford then described in detail the different methods in use up to that time, as well as the eruption and time of eruption of the teeth and laid down



Fig. 2.

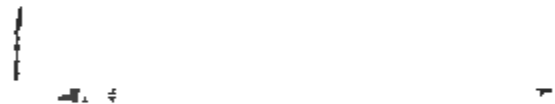


Fig. 3.

the following rules governing extraction as it pertains to the permanent teeth and the treatment of irregularity:

*"Always avoid if possible, extracting any of the six anterior teeth in the superior arch. * * **

*"In the lower jaw any of the incisors may without harm be extracted to gain space. * * **

*"Back of the anterior teeth, if all are equally good and one must be removed, select the one nearest the posterior to the one out of position. * * **

*"If a tooth other than the nearest to that in malposition be defective, and not too far distant from point of irregularity, extract it instead. * * **

*"If a tooth must be lost, either to allow a more important one to fall into line or to create space, it should be done without delay to accomplish the best results. * * **

*"If a tooth must be removed on one side to obtain space, it does not necessarily follow that its opposite mate should also be extracted. * * **

*"Where there is disparity in size between the two jaws, and two teeth need to be extracted from the more prominent one, it would be a serious mistake to extract also the corresponding teeth in the other and smaller jaw. * * **

"If appearances indicate that certain teeth may have to be removed at some

time before the case is complete, though not in the beginning, perform all the work possible first, and then extract if necessary. * * *

"Needless extraction should be carefully guarded against. * * *

"If a crowded arch calls for or will admit of expansion to advantage, do this in preference to extracting."

The contents of Guilford's first edition of *Orthodontia or Malposition of the Human Teeth*, are divided into three parts. Part I, Principles Involved; Part II, Material and Method; Part III, Specific Forms of Irregularities and their Treatment. The greater part of the work treats of the methods of his predecessors. Under Part III, page 107, he states: *Specific Forms of Irregularity and Their Treatment*.

"While principles and methods may be well understood, illustrations of their application in certain forms of irregularity will be necessary in order that the student may properly comprehend their practical relationship.

Fig. 4.

"So far as ease or difficulty of treatment is concerned, cases of irregularity are naturally divided into two general classes; in one the cases are brought to our notice as soon as the irregularity begins to manifest itself, while in the other the deformity is fully established and confirmed before presentation for treatment. In the first class, occurring usually in children, we have the advantages of easy movement and freedom from complications; while in the second, we have to contend with slow and difficult movement and a variety of unfavorable conditions.

"For these reasons it is deemed advisable to treat of certain forms of irregularity, especially those involving the six anterior teeth of each jaw, under separate heads, according as they present before or after dentition is complete, for the treatment in one case will vary considerably from that required in the other." * * *

We do not find, however, a classification, although in this part he has divided the subject into ten chapters as follows:

1. Incisor Teeth Erupting Outside or Inside of the Arch.
2. Delayed or Mal-Eruption of the Permanent Cuspids.
3. Incisor Teeth Situated Outside or Inside the Arch
After Dentition is Complete.
4. Cuspid Teeth Situated Outside or Inside the Arch.
5. Misplaced Bicuspids.
6. Torsion.
7. Contraction of the Arch.
8. Protrusion of the Upper Jaw.
9. Protrusion of the Lower Jaw or Prognathism.
10. Miscellaneous:
 - Lack of Anterior Occlusion.
 - Reduction of Elongation of the Anterior Teeth.
 - Assisted Eruption of the Anterior Teeth, Tooth
Shaping.

Fig. 5.

Not until the fourth edition in 1905 do we find any definite mention of a classification. Under Part III, Page 139:

"Classification of Irregularities and Practical Treatment."

"In the classification of irregularities it has seemed best not to base the varieties upon simple occlusion of the teeth but to arrange them into groups or classes, each class having certain distinctive characteristics; in any case it may easily be referred to its proper class, where all matters relating to its treatment will be found.

"Occlusion has much to do with both the causes for and the proper treatment of irregularities, but to base a system of classification entirely upon it would be at variance with the custom prevailing in other departments of natural science where marked physical characteristics, their correspondence

or their variation are made the basis for arrangement into separate order of classes.

"There are two natural general divisions which include all forms of irregularity commonly met with.

"The first of these is 'Simple Irregularities,' including all those lesser malpositions in which few teeth are involved and where such malposition bears no important relation to facial harmony.

"The second division is 'Complex Irregularities,' which must include all cases where there is extensive malposition of the teeth or jaws and corresponding dento-facial deformity."

Division I.

Simple Irregularities

- Class 1. Labial and Lingual Malposition
- Class 2. Mesial and Distal Malposition
- Class 3. Extrusion and Intrusion
- Class 4. Torsion

Division II.

Complex Irregularities

- Class 1. Malposition of Anterior Teeth
 - A. Normal Buccal Occlusion
 - B. Abnormal Buccal Occlusion { Unilateral
Bilateral
- Class 2. Upper Protrusion
 - A. Lower Normal
 - B. Lower Retruded
- Class 3. Lower Protrusion
 - A. Upper Normal
 - B. Upper Retruded.
- Class 4. Upper Retrusion—Lower Normal
- Class 5. Lower Retrusion—Upper Normal
- Class 6. Bimaxillary Protrusion.
- Class 7. Nonocclusion

The following is a list of *Guilford's* most important articles:

"Orthodontia Technology," *Items of Interest*, 1904, p. 501.

"When Is Radical Treatment—Orthodontia Justifiable?" *Items of Interest*, August, 1905.

"Extraction—When Justifiable in Connection with Orthodontia Operations," *Dental Cosmos*, Sept., 1905.

"Nomenclature in Orthodontia," *Dental Cosmos*, February, 1906.

"Methods of Teaching Orthodontics to Dental Students," *Dental Cosmos*, March, 1916.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

RADIOGRAPHY AND DENTAL AFFECTIONS*

BY J. G. EDWARDS, M.B., M.S., AND W. A. EDWARDS, M.B., B.S.

Honorary Radiographers to the Sydney and St. Vincent's Hospitals

THE radiographic method of examining dead and devitalized teeth has become general practice only during the last few years. For many years we have been making examinations of such conditions as fracture, new growth, impacted and unerupted teeth, but such examinations have been made at the request of the general surgeon and not the dental surgeon. At the present time no dentist can be considered up to date in his work unless he avails himself of the help of the radiologist.

We do not intend to devote much time to the description of apparatus tonight; any moderate sized outfit can be utilized as long as exposures do not exceed about fifteen seconds; if exposure be too prolonged, blurring will be caused owing to the inability of the patient to keep perfectly still.

We use Buck's "X-graph" films exclusively and find a diaphragm designed by ourselves of great use in preventing distortion.

The film is placed in the mouth and held against the lingual surface of the tooth, the tooth and alveolus coming between the film and the tube; the incident rays should strike the film almost at right angles and with a little practice it is easy to prevent distortion. If the tube is tilted too much foreshortening of the teeth appears in the picture and if the skiagram is taken with the tube too perpendicular to the skin surface, elongation of the teeth in the resultant image is produced.

It is a good practice not to attempt to get too many teeth on one film. We aim to get two teeth only.

For the lower teeth we use a Leach's film holder, as it allows the film to be placed low in the space between the teeth and the tongue.

*Read at a Meeting of the New South Wales Branch of the British Medical Association on May 27, 1921.—Reprinted from the Medical Journal of Australia, August 20, 1921.

Radiography is not dangerous to the patient if care be taken not to make repeated exposures over the same skin area, while if a millimetre of aluminium is placed between the tube and the patient, several exposures may be made with safety. Operators should on no account hold the films in place during an exposure; the patient should be made to do this. I have seen many cases of radio-dermatitis from neglect in this respect.

Shocks from high-tension currents are not dangerous, but it is as well to carry all wires high up and out of reach of any possible contact with the patient.

Great attention has recently been paid to the possibility of many systemic diseases being due to absorption from septic foci; the commonest sources of such absorption are the genitourinary tract, colon, sinuses of the head, and teeth. Clinical examination will generally reveal trouble in all these sites with the exception of the teeth. The teeth may be extensively involved, yet the most careful dental examination will not reveal any trouble and such trouble would be overlooked unless the teeth were subjected to radiographic examination.

Periapical abscess and pyorrhea are the two great dental troubles and of the two the periapical abscess is the more dangerous, as the only possibility of drainage is into the general circulation, while in pyorrhea there is always a certain amount of drainage from the gum margins. The failure of chronic periapical abscesses to cause any symptoms is very common and patients will not believe that there is any trouble about their teeth, while many dentists refuse to believe that teeth are diseased unless they can find corroborative clinical evidence, such as pain or tenderness. They often persist in this belief in the presence of undoubted radiographic evidence that such trouble exists.

If a dentist persists in ignoring positive radiographic evidence, how is he to diagnose the presence of periapical disease?

Crowned, pivoted and pulpless teeth are potential sources of trouble and in ill health they should be subjected to early and thorough radiographic examination. It is also well to examine all areas from which teeth have been extracted, as in many cases buried septic roots are found. No tooth should be crowned or dealt with in any way before a radiographic examination has been made; if this were done a great many teeth would never be crowned or pivoted.

Sir William Hunter wrote as follows over ten years ago:

Gold fillings, gold caps, gold bridges, gold crowns and fixed dentures, built in, on or around diseased teeth, form a veritable mausoleum of gold over a mass of sepsis, to which there is no parallel in the whole realm of medicine or surgery.

According to Duke, fully 50 per cent of devitalized teeth show periapical sepsis and a greater percentage of crowns, pivots, fillings and bridges project sufficiently to irritate the gums and leave pockets for sepsis.

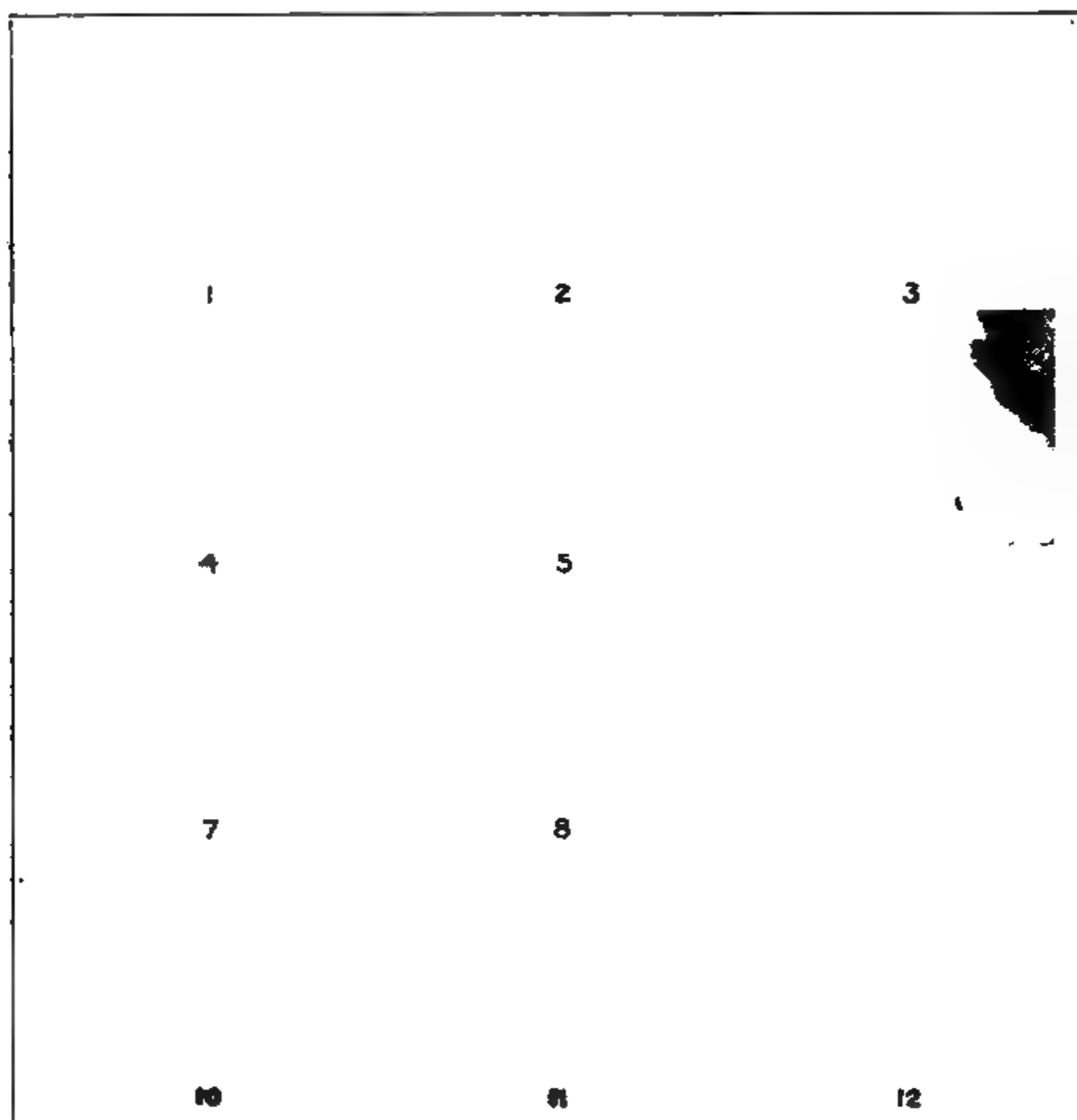
Thoma reports 88 per cent of alveolar abscesses in a large series of patients suffering from various chronic maladies.

Irons reports 77 per cent of alveolar abscesses in persons suffering from chronic arthritic conditions in a large hospital practice, while in a thousand consecutive cases at one medical clinic, Duke found septic foci in 66 per cent. These figures show how common such infections are.

Now, in regard to the interpretation of the radiograms.

Physicians and surgeons have gradually come to recognize that interpretation is an extremely difficult accomplishment and agree that only skilled radiologists can give any opinion of value on a skiagram. Some dentists, however, still consider themselves greater experts at interpretation than the radiologist. The radiologists hope one day to convert them.

A dentist in active practice cannot give sufficient time to the subject to become efficient at interpretation and it is not possible for a man in a single prac-



- 1.—Septic changes about retained stumps.
- 2.—Proximity of bicuspid roots to antrum.
- 3.—Low position of antral floor between bicuspid and molar teeth.
- 4.—Periapical septic foci.
- 5.—Large periapical septic focus.
- 6.—Large dental cyst.
- 7.—Capped tooth with shadow of coronoid process of mandible (often mistaken for a molar tooth).
- 8.—Pyorrheal involvement of alveolus.
- 9.—Pyorrheal involvement of alveolus with dental caries.
- 10.—Ill-fitting pivot tooth.
- 11.—Dental cyst.
- 12.—Septic process between the roots of a lower molar.

tice to see a sufficient variety of cases to allow of him giving an authoritative opinion, in any but the simplest case.

The best method of procedure is for the patient to be examined and reported

upon by an expert radiologist and one engaged only in the practice of radiography, whether he be a medical or dental graduate. When general systemic diseases are in question, the medical man can give a far more valuable opinion than the dentist, owing to his wider training in general pathological conditions and to the fact that he is not walled in by a narrow specialty as is the dental surgeon. Beginners in radiography are apt to be overenthusiastic in their interpretations, but as they grow older, they become more conservative in their opinions and recognize that affected teeth may occasionally be treated by methods other than extraction. Erroneous interpretation means wrong treatment and consequent bad results, which tend to discredit radiography and account for much of the lack of appreciation shown for it.

There are men in practice who are frankly hostile to radiography and try on all occasions to belittle it. They extract the affected tooth and triumphantly display it to the patient, stating that it is normal! Such men display total ignorance of dental pathology, for periapical sepsis is an affection of the periapical bone and not of the tooth root.

Good films are necessary for sound interpretation and the original films only should be viewed; prints are valueless.

A knowledge of the normal appearance of the teeth at all ages is necessary and the interpreter should be conversant with all abnormalities consistent with good health. In skiagrams the normal alveolus shows as a fine lacework with a more condensed fine white line about the tooth socket, while between the socket and the tooth there is a very fine dark line due to the presence of the peridental membrane. Between the upper incisors normally a more transparent area of bone, known as the anterior palatine fossa, is frequently found, while further back the antrum of Highmore appears as a dark area above and about the roots of the premolar and molar teeth. The antrum varies greatly in shape and extent and the tooth roots often appear to project into the antrum, being covered only by a very thin layer of bone. This antral shadow is very frequently diagnosed as a large area of periapical absorption or as a dental or dentigerous cyst.

The coronoid process of the mandible is frequently seen in skiagrams of the upper molar region and it is often interpreted as a tooth or retained root process.

The mental foramen and the dental canal in the lower jaw are also frequently misinterpreted as septic foci.

The lesions met with in the examination of the jaws may be either acute or chronic. The acute processes are of little interest to us, though of absorbing interest to the patient. They usually are confined to one tooth and rapidly progress to abscess, drainage of which leads to cure. The best method of drainage is probably through the socket after extraction of the tooth, but for some unknown reason a dental surgeon can rarely be persuaded to extract a tooth in the presence of an acute process, although it is a surgically sound procedure.

Chronic infections are divisible into two classes:

(i.) Periapical infections, due to the introduction of sepsis through the root canal;

(ii.) Pyorrheal infections due to the entrance of microorganisms form the gum margin.

Pyorrhea alveolaris (chronic osteopericementitis) is due to many causes acting together and producing irritation at the gum margins and allowing of the entrance of micro-organisms. Malocclusion, chronic irritation and decay, defective dental work and pocketing of food particles are the commonest exciting causes. When certain organisms commence their growth in the inflamed gum we have a gingivitis, which, if untreated, proceeds to extend deeply and involves the alveolus and peridental membrane. Streptococci, pneumococci, amebæ, spirochetes and various putrefactive organisms are found in these pyorrheal affections. The extension of the disease leads to destruction of the alveolus and loosening of the teeth; extraction or loss of the tooth provides drainage and cure.¹

Infections through the root canal are secondary to the death of the pulp, whether as the result of ordinary decay or as the result of intentional dental interference in the process of devitalization. It is absolutely impossible to carry out root canal fillings without occasionally introducing sepsis; the organism which is introduced, is in the majority of instances the streptococcus.

The introduction of strong antiseptics, such as arsenic and formaldehyde, causes wide destruction of the periapical tissues and any implanted organisms rapidly grow at a good incubation temperature. This periapical inflammatory change causes death of the bone and the dead area shows in the skiagram as a small rarefied area. Such an area is evidence of disease and in invalids especially it should receive early treatment and drainage.

Streptococci of high virulence rapidly produce abscess with early discharge of pus, but when of low virulence, the process is slow and a space forms about the apex filled with granulation tissue (granuloma); streptococci can be obtained in pure culture from this area. This granuloma may break down and form a thin fluid pus and the condition is then generally referred to as a chronic abscess. This process may or may not be accompanied by absorption and roughening of the tooth root or by a gradual deposit of new cement about the root (hypercementosis or exostosis).

Periapical areas of absorption have no limiting membrane as is usual in abscesses elsewhere, but communicate directly with the blood stream through the Haversian system and the products are easily absorbed.

In the more chronic cases there is a proliferation of the squamous cells of the peridental membrane about the apex and in the periapical inflammatory tissues. These break down (a process of fatty degeneration) in the center and a space is left filled with a clear fluid which gradually extends, causing pressure on and atrophy of the peripheral cells until finally a dense fibrous capsule forms (the dental cyst). The contents of these cysts are sterile and are not a source of septic infection; they only cause trouble when they involve several teeth, causing neuralgia or loosening of the teeth.

Organisms harboured in these chronic foci may remain localized, but should

¹Numerous skiagrams were projected on the screen to illustrate the various stages in this condition in pyorrheal infection.

any part of the body offer a lowered resistance, they find abundant opportunity to cause disturbances at a distance from the original focus.

In regard to treatment, I have little to say. Conservative treatment should never be attempted in invalids; in strong and vigorous individuals it may be attempted in selected cases, but should be frequently checked by radiographic examination.

Root amputations have in my experience rarely succeeded and should only be attempted in the case of the anterior upper teeth.

Teeth should be invariably extracted when a septic focus involves more than one tooth or is close to the antrum.

In pyorrheal cases there is no hope of saving a tooth when more than half the supporting alveolus has been absorbed or when the process has extended between the roots of one of the molars.

Lower teeth need extraction oftener than upper teeth, owing to the difficulty of providing drainage through the root canal.

In conclusion, although these troubles occur almost always in crowned, pivoted and root-filled teeth, it does not follow that these methods of treatment should be abandoned. The causes of failure are twofold, firstly, faulty technic and, secondly, faulty judgment.

Faulty technic is rarely the cause, but faulty judgment is usually the cause. The faulty judgment consists in attempting reconstructive dentistry on diseased teeth. If every tooth were radiographed before crowning or pivoting, the number of cases of periapical sepsis would be enormously decreased.

PATENTS

DENTAL PLIERS, PATENTED MAY 27, 1919*

THIS invention relates particularly to that type of dental pliers used in placing bands upon teeth, and in shaping the band material about the tooth to be fitted.

The main object of the invention is to provide a pliers of the class described adapted to conveniently and firmly grasp the two ends of the band material, and to hold it while it is being shaped about the tooth.

Another object of the invention is to provide in a pliers of the class described, means whereby the two ends of the band material will be accurately held, and to prevent them from slipping or sliding one over the other, during the act of clamping or gripping them with the pliers.

In the drawing, Figure 1 is a side elevation of a pliers constructed in accordance with this invention, showing the jaws closed;

Fig. 2 a similar view, showing the jaws open;

Fig. 3 an edge view of the pliers;

Fig. 4 a detail sectional view taken on the line IV—IV of Fig. 1;

Fig. 5 an enlarged detail view, showing the plier jaws open and the band material in place between them; and

Fig. 6 a view similar to Fig. 5, showing the jaws closed and the band material clamped between them.

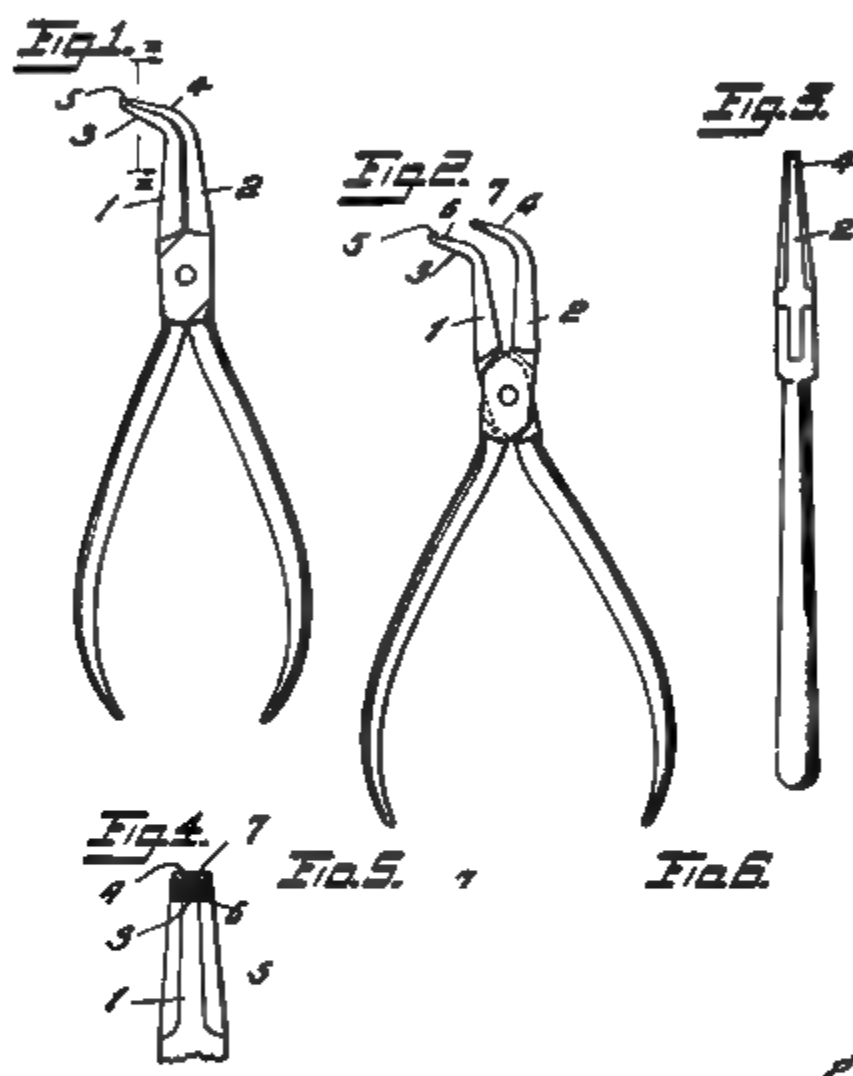
Referring to the various parts by numerals, 1 and 2 designate the jaws of the pliers, said jaws being carried by the usual handle members which are crossed and pivoted together in any well-known manner. The jaw 1 is provided at its outer end with a laterally extending beak 3; and the jaw 2 is provided with a corresponding laterally extending beak 4 which is adapted to be brought into engagement with the beak 3 when the jaws are brought together. The beaks 3 and 4 are in the same plane with the jaws, the jaws and the beaks lying in a plane transverse of the axis of the pivot.

The beak 3 at its free end is formed with an outwardly extending stop lug 5; and a short distance inwardly from said lug it is formed on its clamping face with a gripping lug 6. The beak 4 is provided on its inner or clamping face with a slight depression 7, adapted to receive the gripping lug 6 of the opposite clamping beak. When the jaws and beaks are brought together into clamping position, the end of the beak 4 will abut against the stop lug 5, and the gripping lug 6 will be received in the recess 7, as shown clearly in Figs. 4 and 6.

In using the pliers the two ends of the banding material 8 and 9, are brought together on the clamping face of the beak 3, and over the gripping lug 6, as shown in Fig. 5. The clamping jaws and the beaks are then brought together,

*Patent No. 1,304,720, United States Patent Office.

and because of the peculiar movement of the beaks in approaching each other, the two ends of the band material will be forced against the stop lug 5 and finally gripped tightly by the gripping lug, indenting the band material into the recess 7. The stop lug insures the two ends of the band material being accurately placed one over the other, said lug forming a stop which is adapted to be engaged by the edges of the two end portions of the said material. The stop lug also serves as a guide to the operator in placing the band material on the clamping surface of the beak 3, said lug serving in the nature of a gage. If in placing the two end portions of the band material on the beak 3 the said edges should



1,304,720—Dental Pliers.

not be accurately alined with the stop lug, they will be brought against said stop lug by the gripping action of the beaks.

The position of the beaks with respect to the jaws and with respect to the handles of the pliers is important, as it enables the operator to conveniently place said beaks on the inner side of the tooth to be operated upon, and to securely and accurately hold the banding material while shaping it about the tooth.

What I claim is:

1. A dental pliers, comprising a pair of jaws and handles therefor, each of said jaws being formed with a laterally extending clamping beak, said beaks lying in the same plane as the jaws, said plane being transverse of the axis of

the pivot of said jaws, a stop lug formed on one of said beaks at the outer end thereof, said stop lug serving as a gage and as a stop for the other beak.

2. A dental pliers, comprising a pair of jaws and handles therefor, each of said jaws being formed with a laterally extending clamping beak, said beaks lying in the same plane as the jaws, said plane being transverse of the axis of the pivot of said jaws, a stop lug formed on one of said beaks at the outer end thereof, said stop lug serving as a gage and as a stop for the other beak, a gripping lug carried by one of said beaks, and a recess formed in the other beak to receive said gripping lug.

3. A dental pliers, comprising a pair of jaws and handles therefor, each of said jaws being formed with a laterally extending clamping beak, said beaks lying in the same plane as the jaws, said plane being transverse of the axis of the pivot of said jaws, a stop lug formed on one of said beaks at the outer end thereof, said stop lug serving as a gage and as a stop for the other beak, a gripping lug formed on the beak carrying the stop lug, and a recess formed in the other beak to receive said gripping lug.

ORTHODONTIA APPLIANCE, PATENTED MAY 27, 1919*

THIS invention relates to improvements in orthodontia appliances or tooth-regulating and retaining appliances of the arch wire type. Appliances of this type comprise a curved arch wire or delivery member of approximately the same form as the dental arch, means for connecting the delivery member to a tooth or teeth to be treated, and means for anchoring the delivery member at or adjacent its ends to suitable anchor teeth, such as molars. The movement of the malposed tooth or teeth to normal position in the dental arch is accomplished by distending, shifting or contracting the arch wire or bar relatively to the anchoring means either by shifting the arch wire bodily relatively to the anchoring means by adjusting nuts threaded on the wire, as shown, for example, in the patent to Angle, No. 626,476, dated June 6, 1899, or by altering the length of the arch wire by bending, crimping, or stretching the wire, as shown, for example, in the patent to Angle and Young, No. 1,005,131, dated October 10, 1911.

The present invention has for one of its objects the provision of more efficient means for detachably locking the arch wire or delivery member to the anchor teeth and the malposed teeth.

Another object of the invention is to provide means for connecting the delivery member to the anchor teeth and the malposed teeth adapted for use with either of the two types of appliances above described, and a further object is to provide detachably interlocked means adapted for use to connect either an inside or outside arch wire with the anchor teeth and malposed teeth.

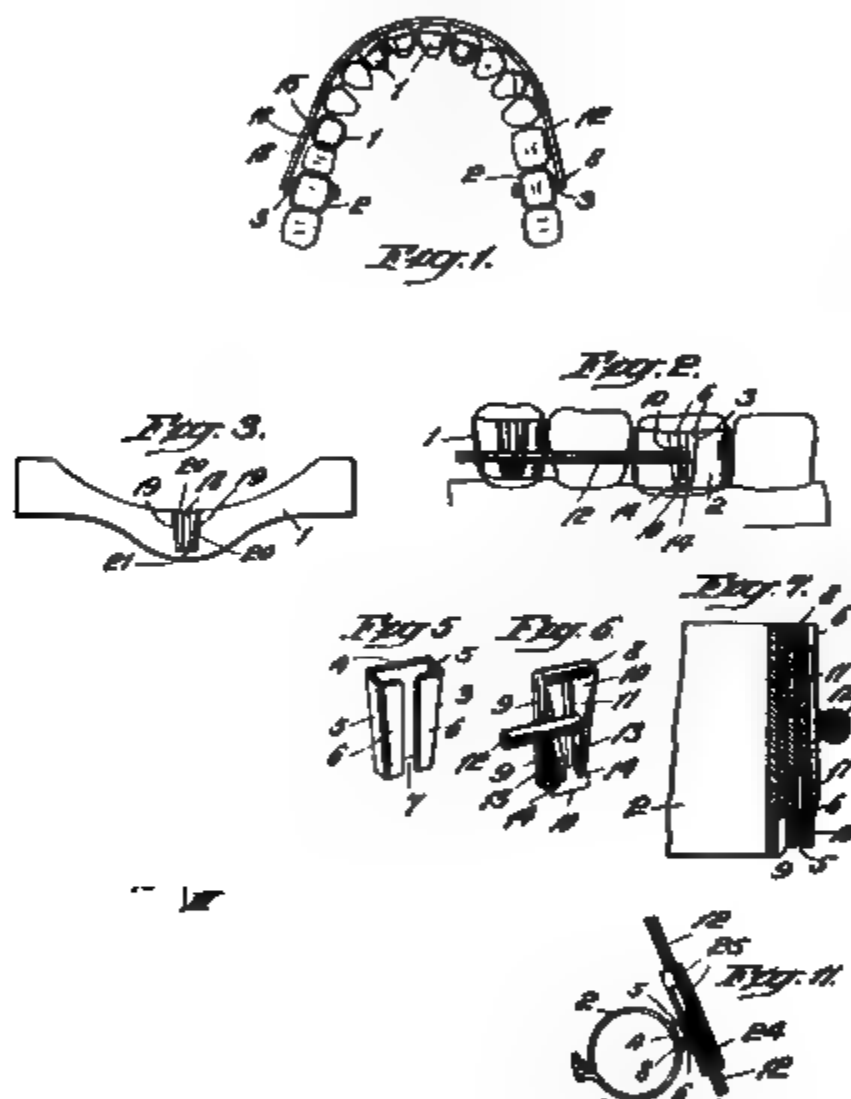
Another object of the invention is to provide cooperating sets of separably interlocked devices carried by the arch wire and teeth, respectively, for positively but releasably locking the appliance in place in the mouth to prevent accidental

*Patent No. 1,304,721, United States Patent Office.

displacement of the appliance, or removal of the appliance by the patient, especially by children, said separably interlocked devices being so constructed as to enable the appliance to be readily removed by the dental surgeon.

A further object is to provide interlocking connections between the arch wire and the teeth, so constructed that the arch wire may extend around the arch in the same horizontal plane throughout its length and in planes different distances from the crowns of the teeth.

Another object of the invention is to provide cooperating sets of separably interlocked devices held to the arch wire and teeth, respectively, and so constructed that the devices will not engage the gum when interlocked; and still another object is to provide positively but separably interlocking devices so con-



1,304,721—Orthodontia Appliance.

structed as to insure firm and rigid connections between the arch wire and the teeth and to prevent relatively lateral movement between the cooperating interlocked devices.

In the drawings, Figure 1 is a plan view of the appliance mounted on the teeth, showing one embodiment of the invention;

Fig. 2 a fragmentary side elevation;

Fig. 3 a detail view of a band adapted to be bent around a malposed tooth and secured thereon by soldering its overlapped ends together, said band having soldered thereon the female member of the interlocking connection by which the arch wire is connected with the band;

Fig. 4 an enlarged side elevation showing the interlocking connection between the end of the arch wire and one of the anchor bands;

Fig. 5 a detail perspective view of the female member of the interlocking connection shown in Fig. 4;

Fig. 6 a detail perspective view of the male member of the connection shown in Fig. 4;

Fig. 7 a vertical sectional view taken on the line VII—VII of Fig. 4;

Fig. 8 a view similar to Fig. 4 showing the interlocking connection between the arch wire and the band on a malposed tooth;

Fig. 9 a plan view of the connection shown in Fig. 8;

Fig. 10 a vertical section taken on the line X—X of Fig. 8; and

Fig. 11 a plan view, partly in horizontal section, showing the manner of anchoring the arch wire when a tube and adjusting nut is employed for altering the length of the wire.

Referring to the various parts by numerals, 1 designates the metal bands fitted about the malposed teeth and 2 designates the usual anchor bands fitted about the molar or anchor teeth. The anchor bands 2 each have soldered or otherwise secured thereto the female member 3 of a separable connection. The female or socket member 3 comprises a back plate 4 soldered to band 2 and bent to form inclined side walls 5 and vertical flanges 6 parallel with and spaced from the back plate. The member 3 thus formed provides a tapering socket, as clearly shown in Figs. 4 and 5, the front wall of which is slotted vertically throughout its length at 7. The male member 8 of the anchoring connection comprises a spring metal plate doubled upon itself to form a back member 9 and a front member 10, tapering from their upper ends to their lower ends and having their free lower ends normally spaced apart, as clearly shown in Figs. 6 and 7. The front portion 10 is provided with a vertically extending central rib 11 and the adjacent end of the arch wire or delivery member 12 is soldered to said rib at any desired point along the rib. The outer face of the front portion 10 of the member 8 is cut away along each side of the rib 11 from a point adjacent the free lower end thereof to a point adjacent its upper end, to form beveled surfaces 13 and shoulders 14. It will be obvious that by pressing the portions 9 and 10 of member 8 together and forcing the same downwardly through member 3, the free ends of said portions will spring apart as soon as shoulders 14 pass the lower ends of flanges 6 until the beveled surfaces 13 engage the inner sides of said flanges, whereupon the shoulders 14 will engage under the lower ends of the flanges and lock members 3 and 8 against separation. During the act of interlocking members 3 and 8, and after said members are interlocked, the rib 11 projects outwardly through the slot 7 and the arch wire 12 lies outside of the member 3.

The arch wire or delivery member 12 comprises a stiff spring wire or bar curved or bowed to approximate the curvature of the dental arch, and has soldered thereto at the proper point or points the male members 15 of coupling devices for connecting the arch wire with the bands 1 fitted about the malposed teeth. The members or posts 15 are formed of resilient metal and are preferably relatively flat in horizontal section, the lower portion of each post being bent out-

wardly, as shown in Fig. 10. The posts 15 gradually decrease in width from their upper to their lower ends, and the side edges thereof are beveled as shown at 16. The posts 15 are formed with vertical central ribs 17 on their outer faces and the arch wire or bar 12 is soldered to said ribs at any suitable or desired point along the length of the ribs. The outer face of each post is cut away along each side of rib 17 to form shoulders 22 and beveled or inclined surfaces 23, the cut-away portions gradually decreasing in depth toward the upper ends of the posts. Downwardly tapered female or socket members 18 are soldered to the bands 1, said members being of substantially the same construction as the socket members 3, and comprising a metallic plate bent to form inclined side walls 19 provided with flanges 20 parallel with and spaced from the rear wall of the member. The downwardly inclined side walls 19 of the socket members 18 are also bent inwardly toward each other, as shown more clearly in Figs. 8 and 9, and the adjacent edges of flanges 20 are spaced apart to provide an opening or vertical slot 21 extending throughout the length of the socket member.

The members 15 and 18 are interlocked by forcing the member 15 downwardly into member 18, the rib 17 on member 18 passing through the slot 21 and the arch wire 12 passing down along the outer sides of flanges 20, as shown in Figs. 8 to 10. During the downward movement of post 15 the outwardly bent lower portion thereof will yield rearwardly and be in alinement with the upper portion of the post, but as soon as shoulders 22 pass below the lower ends of flanges 20 the lower end of the post will spring outwardly to its normal position, whereupon the inclined faces 23 will engage the inner sides of flanges 20 and shoulders 22 will engage under the lower ends of flanges 20, thus positively locking the coupling members 15 and 18 together.

The anchor lock above described may also be employed in an appliance of the type heretofore described in which the arch wire or delivery member is supported at its ends in anchor tubes and is adjusted by means of nuts threaded on the arch wire and engaging the tubes. When so employed, I prefer to solder the back plate 4 of the socket member 3 to the anchor band 2 and solder the anchor tube 24 at the desired point along rib 11 on the front portion 10 of male member 8, as shown in Fig. 11. With this construction it will be observed that the anchor tubes 24, arch wire 12, and adjusting nuts 25 may be removed bodily in assembled relation from the mouth without the necessity of disturbing the adjustment of the nuts 25 on the arch wire.

The tapered formation of the male and socket members of the interlocking connections prevents lateral movement between the members and insures a firm and rigid connection between the arch wire and the teeth. The interlocked members 3 and 8 may be readily separated by pressing the lower end of the front portion of member 8 inwardly by means of a suitable implement and pulling upwardly on the arch wire 12. The members 15 and 18 may be readily separated by pressing the outwardly bent lower end of member 15 inwardly and pulling upwardly on the arch wire.

What I claim is:

1. An orthodontia appliance embodying an anchor band adapted for connection to a tooth, a tapered socket member fixed on the outer side of said band

and having its smaller end terminating intermediate the edges of the band, an arch member, a tapered post member of resilient material fixed to the arch member adapted to engage in said socket member and provided with an abutment adjacent its smaller end adapted to engage under the lower edge of the socket member.

2. An appliance of the class set forth embodying a band adapted to be secured about a tooth, a socket member fixed to the outer surface of the band and provided with a slot or opening from top to bottom thereof, an arch wire, and a member secured to the arch wire and extending at an angle thereto and cut away to form inclined surfaces adapted to engage the inner surface of the socket member at each side of said slot and abutments adapted to engage one end of the socket member at opposite sides of said slot when said members are in engagement with each other.

3. An appliance of the class set forth embodying a band adapted to be secured to a tooth, a socket member fixed to said band and provided with a vertical slot extending from top to bottom thereof, a post member adapted to engage in said socket member and formed with a vertical rib adapted to project through said slot, and an arch member secured to said rib.

4. An appliance of the class set forth comprising a band adapted to be secured about a tooth, a socket member fixed to said band and having its outer wall slotted vertically throughout its length, a post member of resilient material formed with a vertically extending raised portion adapted to project through said slot and inclined surfaces at each side of said raised portions, said post member being also formed with abutments at one end of said inclined surfaces adapted to engage under one end of the socket member at opposite sides of said slot and being bent to cause that portion of the member provided with the abutments to move outwardly automatically when the abutments pass beyond the end of the socket member, and an arch member secured to said rib intermediate the ends of the post member.

5. An appliance of the class set forth comprising a band adapted to be secured about a tooth, a socket member fixed to said band and having its outer wall slotted vertically throughout its length, a post member adapted to engage in said socket member formed of a strip of resilient metal doubled upon itself with its ends normally spaced apart, one portion of the doubled member being formed with a vertically extending raised portion on its outer face adapted to project through said slot and inclined surfaces at opposite sides of the raised portion terminating adjacent the free end of said portion to form abutments adapted to engage one end of the socket member at opposite sides of the slot, and an arch member secured to said raised portion intermediate the ends of the post member.

6. Means for connecting the delivery member of an orthodontia appliance to a tooth band comprising a pair of relatively slidable post-and-socket members tapered longitudinally, one of said members having a yieldable portion carrying an abutment adapted to engage the smaller end of the other member to releasably lock the members together, and one of said members being fixed to the tooth band and the other member being removable with the delivery member.

7. Means for connecting the delivery member of an orthodontia appliance to

a tooth band comprising a tapered socket member fixed on the tooth band slotted at one side throughout its length, a tapered post member having a yieldable portion provided with an abutment adapted to engage the edge of the smaller end of the socket member to detachably lock the post member in the socket member, said post member being formed with a longitudinally extending raised portion adapted to project through the slot in the socket member and with which the delivery member is connected.

8. An orthodontia appliance comprising a tooth-embracing band, a socket member fixed to the outer surface of the band and provided with a slot extending from top to bottom thereof, an arch wire, and a resilient post fixed on the arch wire and extending at an angle thereto, said post having one end normally deflected and cut away on the concave face thereof to form abutments adapted to engage under one end of the socket member at opposite sides of the slot.

9. An orthodontia appliance comprising a tooth band, a coupling member carried by the band and lying within the planes of the edges thereof, a delivery member, and a coupling member carried by the delivery member adapted to be detachably interlocked with the first-mentioned coupling member and to lie between the planes of the edges of the tooth band when so interlocked.

ORTHODONTIA APPLIANCE, PATENTED MAY 27, 1919*

THIS invention relates to improvements in orthodontia appliances or tooth-regulating and retaining appliances of the arch wire type.

The present invention has for one of its objects the provision of efficient means for detachably locking the arch wire or delivery member to the anchor teeth and the malposed teeth.

Another object is to provide detachably interlocked means adapted for use with either an inside or outside arch wire for positively locking the arch wire to the anchor teeth.

Another object of the invention is to provide cooperating sets of separably interlocked devices held to the arch wire and teeth respectively, and so constructed that the devices will not engage the gum when interlocked; and still another object is to provide positively but separably interlocking devices so constructed as to insure firm and rigid connections between the arch wire and the teeth and to prevent relatively lateral movement between the cooperating interlocked devices.

A further important object of the invention is the provision of a separable coupling for connecting an arch wire to tooth bands comprising relatively slidable interlocking members, which coupling may be made and sold independently of the arch wire and bands and the members of which may be readily affixed or soldered to the arch wire and bands at the desired points by the dental surgeon.

In the drawings, Figure 1 is a plan view of one embodiment of the invention and showing the arch wire or delivery member and the anchoring means;

Fig. 2 an enlarged vertical sectional view taken on the line 2—2 of Fig. 1;

*Patent No. 1,304,722, United States Patent Office.

Fig. 3 a detail side elevation showing the anchoring means at one end of the arch wire;

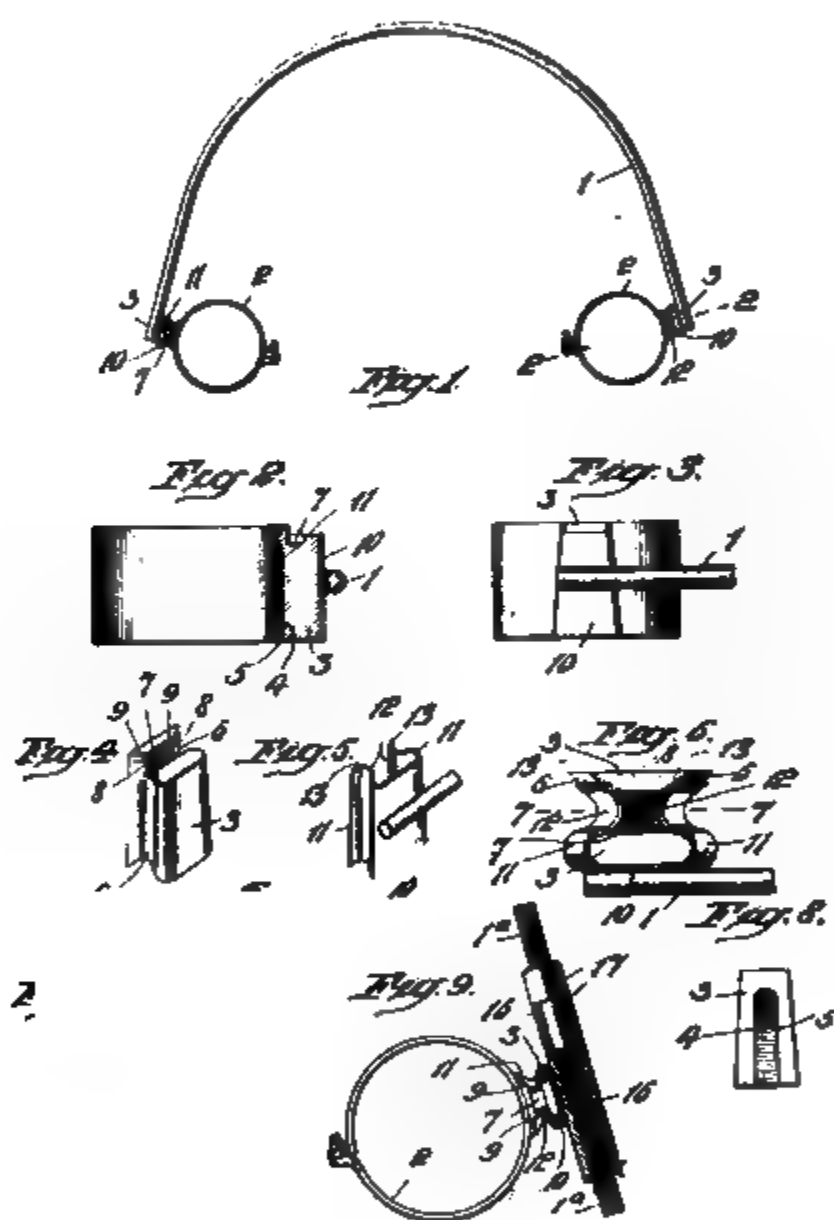
Figs. 4 and 5 detail perspective views of the male and female members of the separable coupling, respectively;

Fig. 6 an enlarged plan view of the coupling members in interlocked relation;

Fig. 7 a vertical sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 a rear elevation of the male coupling member; and

Fig. 9 a detail plan view showing the separable coupling applied to an appliance of the type shown in patent to Angle, No. 626,476.



1,304,722—Orthodontia Appliance.

Referring to the various parts by numerals, 1 designates the delivery member or arch bar which may be of any usual or suitable construction, preferably being formed of a piece of stiff resilient wire bent to conform to the curvature of the dental arch, and 2 designates the usual anchor bands adapted to be fitted about the anchor teeth or molars in the well-known manner.

The separable locking connections between the arch wire and the two anchor bands 2 are of the same construction. Each of said connections embodies a post coupling member, block or post 3 the rear face of which is soldered to the outer surface of the anchor band 2.

I prefer to form a recess or cavity 4 in the rear face of the post 3 which may be filled with solder 5, either by the dental surgeon or the manufacturer. By filling the cavity with solder flush with the rear face of the post the post may be readily secured to the anchor band by simply heating the solder and placing the rear face of the post against the band. This method of soldering the post to the band avoids waste of solder and also avoids running of surplus solder beyond the sides of the post where it would interfere with the engagement of the socket member of the coupling with the post. The sides of post 3 taper from one end to the other of the post and are provided with longitudinal grooves 6. The smaller end of the post is formed with a transverse slot 7 extending from one groove 6 to the other groove, and that portion of the sides of the post between the rear wall of the slot and the rear face of the post is provided with oppositely disposed notches 8 forming shoulders or abutments 9 adjacent the smaller end of the post.

The socket member 10 is formed of a piece of resilient sheet metal bent to form a tapered plate provided with inclined side flanges 11 pressed inwardly longitudinally thereof to form ribs 12 adapted to slide in the grooves 6 in the sides of the post or block 3. The outer corners of the flanges at the smaller end of member 10 are bent laterally to form projections 13 adapted to snap in the notches 8 under shoulders 9 on post 3 when the member 10 is moved downwardly about the post. The post 3 is preferably of the same length as the width of the anchor band, and the member 10 is preferably shorter than the post 3 so that the ends of the post and member 10 will not extend beyond the edges of the band when the post and member are in interlocked relation.

When the two relatively slidable members of the separable connection are interlocked as shown in Figs. 1 to 3, and Figs. 6 and 7, accidental separation of the members is impossible owing to the engagement of the laterally bent corners 13 of the flanges 12 of the socket member in the notches 8 in the post or block 3. This positive lock also serves to prevent the patient, and particularly children, from tampering with the appliance and partially or entirely disconnecting the delivery member from the teeth. The delivery member may be readily detached by the dental surgeon by means of a suitable implement, such as that shown in Fig. 7, having a wedge-shaped head 14 and a suitable handle 15, or by means of a small pair of pliers having relatively sharp or thin jaws. It will be obvious that by forcing the wedge-shaped head 14 of the implement 15 downward in the slot 7 in the smaller end of post or block 3, the adjacent ends of flanges 12 on the socket members, which extend above the bottom of said slot, will be forced outwardly away from each other, thus releasing the projections 13 on the flanges from the notches 8, whereupon the members 3 and 10 may be readily separated by giving them a relative longitudinal sliding movement. To release the socket member by means of a pair of pliers, the points of the jaws of the pliers are inserted in the slot 7 and the jaws are then spread apart to force flanges 12 away from each other.

The separable coupling above described is also adapted for use with an appliance of the type shown in the patent to Angle, No. 626,476, above referred to.

When so employed, the post or block 3 is preferably soldered to the anchor band 2 in the manner above described, and the socket member 10 is soldered at any desired point intermediate its ends to the usual anchor tube 16 employed in this type of appliance, as shown in Fig. 9. The arch wire or delivery member 1^a is threaded at its ends in the usual manner, and adjusting nuts 17 are threaded on the ends of the wire 1^a and cooperate with tubes 16 in the usual manner. In the construction shown in Fig. 9 it will be observed that the anchor tubes 16, adjusting nuts 17, and the arch wire or delivery member 1^a may be removed bodily in assembled relation from the mouth without disturbing the adjustment of the nuts 17 on the arch wire 1^a.

The tapered formation of the two interlocking members 3 and 10 insures an accurate fit of the member 10 about member 3, thus preventing relative lateral movement of the interlocked members and affording a firm and rigid connection between the arch wire and the anchor tooth. It will be observed also that the separable coupling may be employed, if desired, to connect the arch wire with bands fitted on the malposed teeth.

What I claim is:

1. An orthodontia appliance comprising a curved delivery member, bands adapted to be secured to teeth, and two-part separable couplings for holding the delivery member to the bands, one part of each coupling being connected with a band and the other with the delivery member and each of said couplings embodying a post having undercut sides and a plate having side flanges bent inwardly toward each other to slidably engage the under-cut sides of said post.

2. An orthodontia appliance comprising a curved delivery member, bands adapted to be secured to teeth, and two-part separable couplings for holding the delivery member to the bands, one part of each coupling being connected with a band and the other with the delivery member and each of said couplings embodying a post having undercut sides and a plate having side flanges bent inwardly toward each other to slidably engage the under-cut sides of said post, said post being formed with a shoulder adjacent one end thereof and one of the flanges on said plate being formed with a laterally projecting portion adapted to engage said shoulder to lock the post and plate against relative longitudinal movement.

3. An orthodontia appliance comprising a delivery member, tooth-embracing bands, and two-part separable couplings for detachably connecting the delivery member with said bands one part of each coupling being fixed to a band and the other being connected with the delivery member, each coupling embodying a tapered post having under-cut sides and recesses at opposite sides of the post adjacent the smaller end thereof, and a tapered socket part having one open face and inwardly pressed sides adapted to slidably embrace the post, the sides of said socket being each formed with a lateral projection adjacent the smaller end of said part adapted to engage in one of the recesses in the post to lock the parts together.

4. An orthodontia appliance comprising an arch wire, tooth bands, and two-part separable couplings for detachably locking the wire to the bands, one

part of each coupling being fixed to a band and the other to the arch wire, each coupling embodying a tapered post having its sides formed with longitudinal grooves and provided with a transverse slot at its smaller end extending between said grooves and shoulders at the ends of said slot, and a tapered socket comprising a plate having yieldable side flanges pressed inwardly longitudinally to form ribs adapted to slide in the grooves on the post, each of said flanges being provided with a lateral projection adjacent the smaller end of the socket adapted to engage one of the shoulders on the post to lock the parts together.

5. An orthodontia appliance comprising anchor bands adapted to embrace posterior teeth of the dental arch, a tapered block having its inner face soldered to each band, said block being formed with longitudinal channels in the sides thereof connected at the smaller end of the block by a transverse slot and the sides of said block being provided with recesses above the bottom of said slot, an arch wire, tapered plates soldered to the arch wire adjacent the ends of said wire and formed with side flanges bent inwardly toward each other to engage in the channels in said block, the flanges on said plates being formed with projections adapted to engage in the recesses in the block to lock the plate and block against relative longitudinal movement.

6. The combination with a tooth-embracing band and the arch wire of an orthodontia appliance, of a two-part separable locking device embodying a block having a cavity in its inner face containing solder for attaching the block to the band, and a substantially U-shaped member soldered to the arch wire slidably embracing the block to move longitudinally thereof, said member and block being formed with cooperating longitudinally extending interlocking portions for holding the block and member against relative lateral movement.

7. The combination with a tooth-embracing band and the arch wire of an orthodontia appliance, of a two-part separable coupling embodying block fixed on the band and a substantially U-shaped member the transverse wall of which is fixed to the arch wire intermediate its ends, the sides of said member having a slidable interlocking connection with the sides of the block to prevent lateral movement of the member and permit connection and disconnection of the members by a relative longitudinal movement.

8. An anchor coupling for orthodontia appliances embodying a block having one face provided with a cavity, solder filling said cavity to adapt the block to be soldered to a tooth-embracing band, and a plate adapted to be connected with an arch wire and provided with side flanges adapted to embrace the sides of said block and having a longitudinally extending tongue-and-groove connection therewith.

9. Means for separably connecting an arch wire to a tooth, embodying a tooth-embracing band, and a two-part coupling, one part of which is fixed on the band and the other part of which is connected with the arch wire, said coupling parts having a tongue-and-groove connection to permit connection and disconnection thereof by a relative longitudinal movement and to prevent relative lateral movement of the parts when connected together.

10. Means for separably connecting an arch wire to a tooth, embodying a tooth-embracing band, and a two-part coupling, one part of which is fixed on the band and the other part of which is connected with the arch wire, said coupling parts having a tongue-and-groove connection to permit connection and disconnection thereof by a relative longitudinal movement and to prevent relative lateral movement of the parts when connected together, and one of said parts being formed with a recess and the other with a yieldable portion carrying a projection adapted to engage in said recess to releasably lock the parts together.

11. An orthodontia appliance comprising a delivery member, a socket coupling member supported by the delivery member and formed with a longitudinally extending channel having inwardly flaring side walls, a tooth-embracing band, and a post coupling member having one face secured to the band and formed with under-cut sides.

12. An orthodontia appliance comprising a delivery member, a socket coupling member having one face soldered to the delivery member at a point intermediate the ends of the coupling member, said coupling member being formed with a longitudinal channel having inwardly flaring side walls, a tooth-embracing band, and a post coupling member soldered to said band and formed with a relatively narrow portion adapted to extend through the throat of the channel in the socket member and an enlarged portion adapted to engage in said channel.

13. An anchor coupling for orthodontia appliances, embodying a block or post forming a coupling member and having one face provided with a cavity, solder filling said cavity to adapt the block to be soldered to a tooth-embracing band, and a plate or socket member adapted to be connected with an arch wire and provided with side flanges adapted to embrace the sides of said block.

14. Means for connecting the arch wire of an orthodontia appliance to a tooth band, comprising a pair of relatively slidable post and socket members tapered longitudinally, one of said members at its smaller end being formed with a transverse abutment, the other one of said members having a yieldable portion at its smaller end adapted to engage the abutment of the other member to releasably lock the members together, one of said members being fixed to the tooth band, and the other member being fixed to the arch wire.

15. Means for connecting the arch wire of an orthodontia appliance to a tooth band, comprising a pair of relatively slidable post and socket members tapered longitudinally, one of said members at its smaller end being formed with a transverse abutment, the other one of said members having a yieldable portion at its smaller end adapted to engage the abutment of the other member to releasably lock the members together, one of said members being fixed to the tooth band and the other member being fixed to the arch wire, the post and socket members being noncircular in cross section to hold the post against relative, rotative movement.

ORTHODONTIA APPLIANCE. PATENTED MAY 27, 1919*

THIS invention relates to improvements in orthodontia appliances or tooth-regulating and retaining appliances of the arch wire type.

The present invention has for one of its objects the provision of efficient means for detachably locking the arch wire or delivery member to the anchor teeth and the malposed teeth.

A further object of the invention is to provide separably interlocked sets of devices for connecting the arch wire with the anchor teeth or malposed teeth, or both, as desired, said devices being so constructed as to permit the arch wire to extend about the dental arch in the same horizontal plane, if desired, and so that the arch wire may be held to one set of devices to extend transversely thereof in horizontal planes at various distances from the plane of the gum.

Another object of the invention is the provision of separably interlocking devices supported by the arch wire and teeth, respectively, so constructed that the devices will not engage the gum when interlocked.

Another object is the provision of positively but separably interlocking sets of devices for connecting the delivery member with the teeth, so constructed as to insure firm and rigid connections between the delivery member and the teeth.

In the drawings, Fig. 1 is a plan view of one embodiment of the invention showing the arch wire and the means for connecting the arch wire to the anchor teeth;

Fig. 2 an enlarged, vertical, sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 an enlarged side elevation showing the anchoring means at one end of the delivery member;

Figs. 4 and 5 detail perspective views of the two members of one of the separable coupling devices;

Fig. 6 a rear elevation of the coupling member shown in Fig. 5;

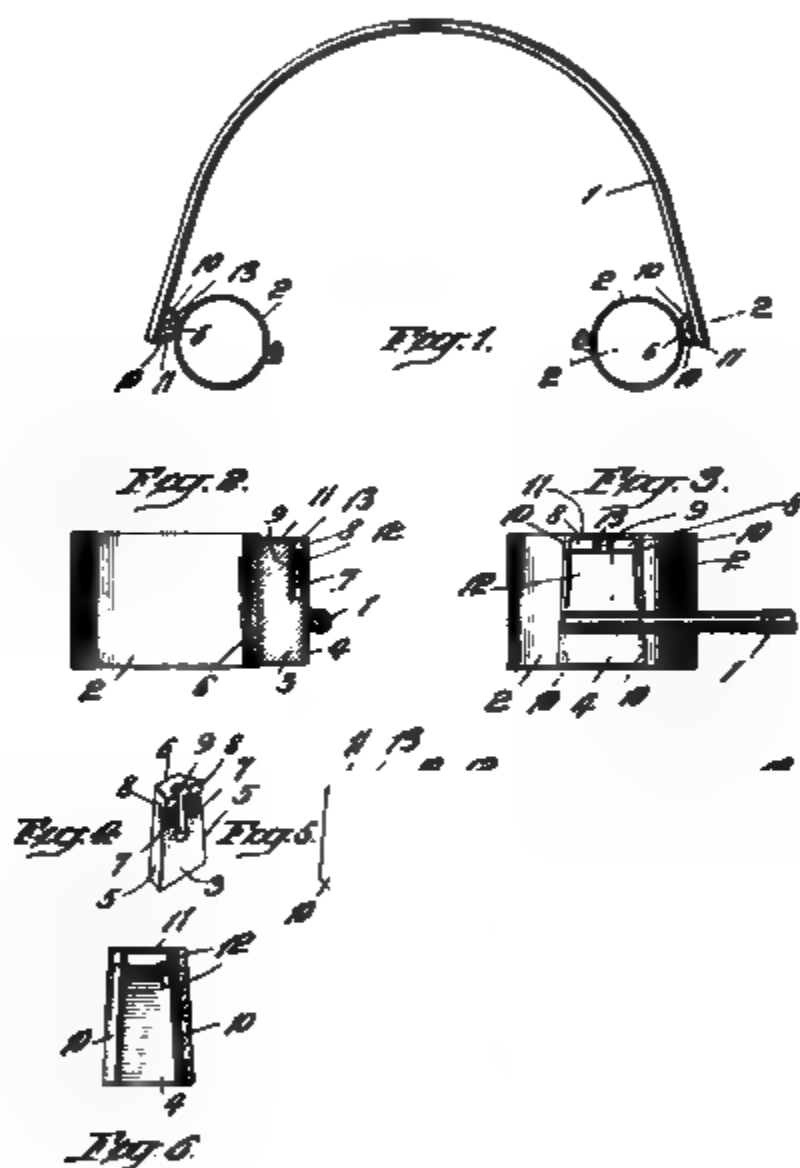
Fig. 7 a fragmentary plan view; partly in horizontal section, showing the coupling embodied in an appliance of the type shown in the patent to Angle, No. 626,476; and

Fig. 8 a vertical sectional view taken on the line 8—8 of Fig. 7.

Referring to the various parts by numerals, 1 designates the curved delivery member, which may be of the usual or any suitable construction, preferably being formed of a piece of relatively stiff resilient wire bent to conform approximately to the curvature of the dental arch, and 2 designates the usual anchor bands adapted to be fitted about the anchor teeth or molars. The separable connections between the anchor bands 2 and the delivery member are of the same construction, and comprise relatively slidable members 3 and 4. The member 3 is in the form of a post or block having tapering side edges 5, which edges are beveled so as to extend inwardly toward each other from the outer face of the block 3 to the inner face 6 of the block. The relatively nar-

*Patent No. 1,304,723, United States Patent Office.

row inner face of the block is soldered to the outer side of the anchor band, and the block 3 is preferably of such length that the ends thereof do not extend beyond the edges of the band 2. The relatively wide outer face of the block or post 3 is notched or cut away to form a depression. The notch in the post is preferably formed, as shown more clearly in Fig. 4, to provide an inclined surface 7 and shoulders or abutments 8, adjacent the smaller end of the tapered block or post 3. The relatively wide outer face of the post 3 is also provided with a vertical groove or channel 9. The socket member 4 is formed of sheet metal, and comprises a tapered plate formed with side flanges 10 bent inwardly toward each other to conform to the beveled and inclined side edges



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1,304,723—Orthodontia Appliance.

5 of the block 3, and with a transverse bar 11 connecting the ends of said flanges together at the smaller end of the tapered socket member. The relatively narrow or rear face of the socket member 4 is open throughout its length, and the relatively wide front plate of the socket member is stamped or cut to form a resilient tongue 12, normally deflected rearwardly toward the narrow open rear side of the socket member 4. The transverse bar 11 connecting the side flanges 10 of the socket member 4 is cut away at its outer or wider edge to form a notch 13, adapted to register with the groove or channel 9 in the post or block 3, when the members 3 and 4 are in engagement with each other. The delivery member or arch wire 1 may be soldered to the wide outer wall of

the socket member 4 at any point intermediate the base of the tongue 12, and the wider end of the socket member.

It will be obvious that when the socket member 4 is slid downwardly about the post or block 3, that the free end of the resilient tongue 12 will snap under the shoulders 8 on the post 3, and thus positively lock the members 3 and 4 together. To disconnect the members 3 and 4, it is simply necessary to insert an instrument having a fine or needle point, downwardly through the notch 13 in the transverse bar 11 of the socket member into the groove or channel 9 in the post 3, and force the point of the implement laterally to press the resilient tongue 12 outwardly from beneath the shoulders 8, whereupon the member 4 may be moved relatively to the member 3, by pressure on the arch wire 1.

The separable connection above described is also adapted for use with an appliance of the type shown in the patent to Angle, No. 626,476, above referred to. When so employed, the post or block 3 is soldered or otherwise fixed to the anchor band 2, as above described, and the socket member 4 is soldered or otherwise fixed to the usual anchor tube 14, employed in this type of appliance. The arch wire 1^a extends through the anchor tube 14, and has threaded thereon the usual adjusting nut 15. In the construction just described, it will be observed that the delivery member or arch wire 1,^a the adjusting nuts 15, and anchor tubes 14, may be removed from the mouth bodily in assembled relation, without disturbing the adjustment of the nuts 15.

The tapered formation of the members 3 and 4 insures an accurate fit of the members 3 within the members 4, and the beveling of the side edges 5 of the post 3 prevents outward movement of the members 4 relatively to the post 3. It will thus be observed that a firm and rigid connection is provided between the delivery member and the anchor band, and that relative movement of the interlocked members of the separable connection is impossible, while the members are in interlocked relation. It will also be observed that accidental disconnection of the delivery member from the teeth is impossible, and that the delivery member cannot be disconnected by the patient, but may be readily removed by the dental surgeon, by means of a suitable implement. It will also be obvious that the separable coupling members 3 and 4 may be employed to connect the delivery member 1 to bands fitted about malposed teeth, as well as to bands fitted about the anchor teeth or molars, and that the delivery member 1 may be soldered or otherwise fixed to the socket member 4 at any desired point intermediate the wider end of the socket member and the base of the tongue 12.

What I claim is:

1. Anchoring means for the delivery member of an orthodontia appliance comprising an anchor band adapted to be fixed to an anchor tooth, a block fixed to said band having outwardly flaring side edges and provided with an abutment on its outer face, a member supported by the delivery member adapted to slide longitudinally of said block having a channel formed with side walls inclined toward each other, and yieldable means carried by said channel member adapted to engage the abutment on the block.

2. Anchoring means for the arched bar of an orthodontia appliance comprising an anchor band, a block affixed to said band having outwardly flaring side edges and provided with an abutment on its outer face, a member connected with the arch wire slidable longitudinally on said block and having a channel formed with side walls inclined toward each other to embrace the flaring side edges of the block, and a resilient tongue carried by said member adapted to engage said abutment on the block.

3. In an orthodontia appliance, the combination with a tooth band and an arched delivery member, of a separable coupling for connecting the delivery member to the band embodying a block having flaring side edges, and a notch or recess in one face thereof, and a socket member having a channel formed to receive the block and having a yieldable portion adapted to engage in a notch or recess in said block to releasably lock the block and the socket member together.

4. Means for detachably locking the arch bar of an orthodontia appliance to a tooth band, embodying two relatively longitudinally slidable members held to the band and arch bar respectively, one of which is provided with flaring side edges and a recess in one face thereof, and the other of which is formed with a channel to receive the other member and a resilient portion at the bottom of said channel adapted to engage in said recess to lock the members in engagement with each other.

5. An orthodontia appliance comprising an arched or curved delivery member, a socket member carried by said delivery member having one open end and an open face and side walls inclined inwardly toward each other, the other face of said socket member being provided with a spring tongue normally deflected toward the open face of the socket member, a band adapted to be secured about a tooth, a block fixed to said band and having outwardly flaring side edges and a notch or recess in its outer face adapted to receive the free end of the spring tongue when said block is engaged in the socket member.

6. An orthodontia appliance comprising a band adapted to be secured to a tooth, a tapered block fixed to said band and having outwardly flaring side edges and a depression in its outer face adjacent the smaller end of the block, a delivery member, a tapered socket member supported on the delivery member and having side walls inclined inwardly toward each other to embrace the tapered and flaring edges of the block, and a spring tongue carried by the socket member adapted to engage in the depression in the block to releasably lock the block and socket member together.

7. An orthodontia appliance comprising a band adapted to be secured to a tooth, a block fixed to said band and having beveled side edges and a transverse notch in its outer face intersected by a longitudinal channel, a metal plate having side flanges bent inwardly toward each other to embrace the beveled edges of the block and a yieldable tongue stamped therefrom adapted to snap in the transverse notch in said block when the plate is slid longitudinally on the block, and a delivery member connected with said plate.

8. An orthodontia appliance comprising a band adapted to be secured to

a tooth, a block fixed to said band and having tapered and beveled side edges and a transverse notch in its outer face, a tapered metal plate slidable longitudinally of said block having inclined side flanges bent inwardly to embrace the tapered and beveled side edges of the block and formed with a resilient tongue normally deflected inwardly between said flanges and adapted to snap in said notch in the block, and a delivery member connected with said plate.

9. In an orthodontia appliance the combination with a tooth band and an arch wire, of a separable coupling for connecting the arch wire to the band embodying a block formed with a notch or recess in one face thereof, and a socket member having a channel formed to receive the block and provided with a resilient tongue adapted to engage in the notch or recess in said block to releasably lock the block and the socket member together, one of said coupling members being connected to the tooth band and the other being connected to the arch wire.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Surgical Treatment of Prognathism. L. Dufourmontel (Paris) *La Presse Médicale*. March 23, 1921, xxix, 24.

The author does not refer to true prognathism but to an acquired condition, a thrusting forward of the mandible in an old unreduced and irreducible dislocation. In cases of this sort bilateral resection of the two condyles is the usual treatment. The author has operated in this manner a number of times. The intervention is not so serious as at first sight appears although the condyle may be ankylosed. The technic is in part as follows: both sides are operated on jointly and incisions are made just above the condyles and the latter with their necks are exposed by means of retractors. This is somewhat tedious on account of the density of the fibrous structures but no dissection is allowable, as there are several important structures which must not be divided—vessels, nerves and parotid gland. The neck of the condyle is now divided by a Gigli saw or gouging forceps, the latter being preferable. The neck of the condyle thus divided, the latter is extirpated without much further trouble. If adhesions exist they rupture when the condyle is forcibly extracted by forceps. When the jaw is placed in its original position the teeth do not meet naturally, for on account of the new position of the ascending ramus the upper incisors project beyond the lower. This requires prosthesis, although it is not unlikely that if left alone this condition would in time rectify itself. But the gaping between the upper and lower arches is a reproach to the operator who takes steps to correct it by prosthesis. In the absence of illustrations the latter cannot be accurately described in a few words but the articulating surfaces of the teeth are first covered by a metal or vulcanite sheath provided with lateral hooks and by means of rubber traction the two jaws are gradually brought together, about 4 weeks being required. The subject is allowed to eat and exercise his new articulation.

Painless Extraction. P. F. Eckstein (Berlin). *Zahntechnische Reform*. March 13, 1921, xxv, 11.

The author's method of painless extraction has been discussed by two colleagues, Hahn and Kolmar, with special reference to the incision which

precedes extraction. It is understood that incision merely to test the action of the anesthetic is not justifiable. In regard to incision practiced for access, Hahn advocates as preferable detachment of the gum with subsequent forcing back, a method known to the ancient Roman dentist. The practice was in vogue in the XVII century when the dentist of the period invariably loosened and pushed back the gum with a spatula before extraction. It is true that for successful extraction the tooth should be grasped deeply and when the forceps is forced strongly into the intact gum the latter is made the seat of a contused wound, which in turn may readily end in necrosis, while in general the crushing type of wound is attacked readily by bacteria in general, so that a focus of infection may originate. The author therefore prefers a clean incised wound of the gum parallel with the root of the tooth. Since there will in any case be an extraction wound, this incision is only a continuation of it. Incision is by no means always necessary and in certain cases the root can be grasped deeply without resort to it. Naturally it is indispensable if resection of the alveolus is necessary. Many modern dentists advocate routine incision before extraction. While Hahn uses the gum separation method Kolmer appears to practice his own incision technic which the author does not repeat, save that it is made but one minute after the anesthetic injection, while he himself always waits 5 to 8 minutes. He does not believe that anesthesia of the gum is the cue to extract the tooth.

Benign Septicemia From Filling the Root of a Molar Tooth. J. Bercher (Val-de-Grace). *La Revue de stomatologie*, March, 1921, xxiii, 3.

The author, who is stomatologist to the military hospital at Val-de-Grace, relates the case of a surgeon-major whose 12 year left lower molar was the seat of an ordinary pulpal necrosis with arthritis and fistula. The x-ray showed that the latter proceeded from the distal root, and that there was no other osseous lesion. When the tooth was opened the canals were found to be badly infected. While they were improved under treatment, the officer was obliged to attend to another matter and there was a long interruption during which the tooth remained open. Root treatment was eventually resumed and in the course of two months the roots were believed to be ready for filling. The formula known as "rose paste" was used but there followed a violent reaction overnight, so that the filling was at once removed with great relief. After further root treatment a simple zinc oxide filling was inserted. There was no local reaction this time, but a severe constitutional disturbance with vomiting and an outbreak of hives, fever and suppression of urine. There was no sign of any local disturbance, and in 24 hours the constitutional reaction had subsided. As the officer was then about to sail on a long voyage the tooth was extracted as a precautionary measure. The phenomenon suggested that an anaphylaxis had occurred but there was no way by which this hypothesis could be visualized. There was no protein substance in the filling material. An intoxication from the formol used in treating the cavity could be excluded. The only remaining explanation is that of a mild septicemia of a type which has recently been much discussed. There

should from this viewpoint have been a focus of pus somewhere in the body which would naturally have been in the not yet disinfected root canals. These explosions, as in the present case, may not last over 24 hours.

Fractures Into Cavities. Weidner. *Deutsche Zahnärztliche Zeitung*. March, 1921, xx, 13.

Fractures of the walls of cavities are not uncommon even with the most correct filling technic. They occur by choice in molars and bicuspid. The usual resource after such an opening results, is to drill and close the breach with amalgam or in rare instances to apply a hollow metal crown. The cause of the accident varies. Naturally it occurs by preference in the walls of large cavities. Secondary caries of the wall of the cavity may or may not be a contributory factor. A tooth with living pulp is less predisposed than one with filled roots. The accident is less common when cement fillings are used and it is the custom of some dentists to line large cavities with cement before inserting amalgam. Some of the conditions of cavity-fractures are dependent in a high degree on technical details which interest only the practitioner in filling. Generally these accidents may be prevented by the use of three resources of which the first refers purely to proper formation of the cavities with strict regard to the histology of the teeth and to the thickness of wall requisite for withstanding the pressure of mastication. The second prerequisite has to do with the fullest possible use of zinc-oxide-phosphate cement, as in lining large cavities before inserting metal fillings. The third resource for the special case is, of course, the use of the hollow metal crown.

The Alterations Which Follow Orthodontic Procedures. A Oser. *Zahntechnische Reform*, April 24, 1921, xxv, 17.

In artificial regulation of the teeth the alveolar process of the jaw is the part most affected next to the teeth themselves, because it consists of two bony plates which closely invest the teeth on both sides. Above, the buccolabial plate is thinner than the palatine, while in the mandible conditions are parallel save that beyond the second molar they are reversed, the lingual plate being the thinner. The bone mass about the anterior teeth is less than that about the posterior and hence the former are more easily regulated. Hence if the front teeth are crowded one should not extract a molar but a bicuspid. Let us take the case of an upper canine which is forced daily by a turn of the regulating screw a quarter of a millimeter from its palatine position in a labial direction. The first action of the screw on the root of the canine is a traumatic one. The spongy bone which invests the root on the labial side is slightly crushed; while laterally and palatwards there is a laceration or fracture of some of the osseous trabeculæ. A slight effusion of blood into the spongy bone results. For about an hour after turning the screw the patient feels sharp pain. Absorption begins in the spongy bone through the action of the osteoclasts. The trabeculæ undergo a partial change into cartilage. Even the bone plates of the alveolar process share in this action. But as certain areas of bone are absorbed new bone is formed from the osteoblastic layer of

the periosteum. At first known as osteoid tissue it becomes true bone through lime deposit. The cycle ends in absorption of this new bone. With each turn of the screw this process is repeated, but the traumatic action becomes progressively less. When the tooth is in its proper place permanent new bone is formed.

Surgical Treatment of Pyorrhea. A. M. Nodine (New York). *The Dental Cosmos*, April, 1921, lxiii, 4.

Pyorrhea appears to have increased notably in the English-speaking countries as a result of the war, presumably from the operation of several factors, such as forced neglect of dental hygiene, the use of preserved foods deficient in vitamine content, and probably local factors such as increased use of tobacco, poor prosthetic work, etc., as a result of which there was an abnormal degree of buccal irritation. For practical purposes pyorrhea is a disease characterized by infection between the peridental membrane, the gum and the supporting bone, in which pockets are formed at the expense of the bone and peridental membrane. The pockets in turn contain a mixture of microorganisms, pus and food detritus, which to the naked eye appears as pus alone. There is no surgical treatment before the pockets form, nor after, so much bone has been destroyed that the teeth have to be extracted. Of the three surgical methods commonly in use the author prefers the operation known as Pickerell's with a special technic of his own. This operation may be termed gingivectomy, and the author believes that it will accomplish all that is claimed for the Zentler flap operation. The diseased gum is cut away and all rough bone is trimmed. The operative field is then painted with iodine, packed with iodoform gauze and allowed to heal, this step requiring about a week. The rationale of the intervention is of course to remove every bit of infected tissue, soft or hard, so that healing will mean that healthy gum tissue contracts about the necks of the teeth. During healing the spaces between the teeth must be kept clean. The exposed tooth surface is sensitive of course but this wears off. The gum should shrink after the operation; if not, this means that infectious tissue remains behind. Massage and brushing the gum is an essential part of the aftertreatment.

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EDITORIALS

Orthodontic Patents

FOR several years the dental profession has been divided into two classes. Those who believe in patents which limit the manufacturer and use of dental instruments and processes and those who are opposed to such patents.

The medical profession has long ago gone on record as being opposed to any member of the profession obtaining a patent on any instrument which is used for the treatment of deformities or the alleviation of human suffering.

The dental profession as a whole has never accepted that high standard, probably because dental manufacturers have greatly influenced the ideals of the dental profession.

Several years ago it was our privilege to examine a number of patents covering orthodontic appliances, and we were amazed to find that certain patents had been granted which would practically control the practice of orthodontia if they were ever enforced. Fortunately a large number of these pat-

ents, if brought into the courts, would be declared null and void, because they had been granted to cover some instrument or process which had been in universal use for a considerable time before the patent was granted.

We believe that the dental profession should take a stand in regard to patents equally as high as the medical profession, and consider any man who will patent an instrument, or appliance to be used in the treatment of human suffering or deformities as unethical, and not entitled to membership in the National Dental Association. No physician or surgeon who holds a patent on instruments can be a member of the American Medical Association, and dentistry should have as high a standard from a humanitarian standpoint.

There is no doubt but that a patent on an instrument or device restricts its use in the treatment of human suffering because it necessarily must be sold at a higher price.

Recently our attention has been called to the issuing of a considerable number of patents which cover orthodontic appliances. Some of said appliances having been in use for a considerable length of time in a very similar form. It is also unfortunate that the majority of these patents have been granted to men who occupy high positions in the orthodontic world, and whose conduct, if governed by the medical standards, would prevent them from filling the positions they now occupy. They should not attempt to control the use of any appliance which is used in the treatment of human deformity.

Fortunately for the science of orthodontia, most of these patented devices are not absolutely necessary in correction of deformities. Their use can be avoided; we have other appliances which perform the same purpose that have not been patented.

The extent to which the patent monopoly is attempting to control orthodontic appliances cannot fail to interest the profession. We shall, in the future, publish several orthodontic patents, of which we have obtained copies. Some of these patents deal with instruments that possess virtues, others are of a questionable nature. Nevertheless, the purpose of the patent is manifest in nearly every case.

In this issue, we are publishing in full four patents which, according to the Patent Office, are known as Patents Nos. 1,304,720—1,304,721—1,304,722—and 1,304,723. The first, No. 1,304,720, is a patent covering dental pliers. This special design of pliers is for the purpose of holding band material, and they are, more strictly speaking, orthodontic pliers rather than dental pliers. The inventor evidently had a good and sufficient reason for using the term dental plier in preference to orthodontic plier.

In No. 1,304,721, we find it is granted to the inventor to cover an orthodontia appliance. This patent granted in 1919 shows several interesting features as regards orthodontic terminology. For instance, for "Orthodontia appliance," there should have been used "Orthodontic appliance," which term was adopted by the American Society of Orthodontists, but was not universally accepted in 1919. We also notice the use of some terms which are to a certain extent superior to words as used by orthodontists; we refer especially to the word "arch." Attention has been called to the fact that "arch" is a term greatly overused. We

speak of "expansion arch" and the "dental arch" meaning two different things. One is a mechanical device and the other is an anatomic structure. In the specifications of letters patent, things must be so described so as to be understandable by the Patent Commissioner. Therefore we find this statement "Appliances of this type comprising a curved arch wire or delivery member of approximately the same form as the dental arch. . . ." We see there the use of "delivery member" as a means of describing the appliance instead of the term "arch," because "dental arch" is also employed in the same sentence. It is also stated that "said inseparable interlocking devices being so constructed so as to enable the appliance to be readily removed by the dental surgeon." We wonder why the term "dental surgeon" has been used instead of orthodontist. Again possibly for the purpose of description, and then maybe because this appliance was not supposed to be used by orthodontists but by dental surgeons!

The cuts illustrating this appliance show clamp bands which are referred to as the "usual anchor bands." We are at a loss to know how clamp bands of such a type could be constructed by using the pliers shown in Patent No. 1,304,720. We also have been informed that the inventor has used only plain molar bands for years prior to 1919. Then why clamp bands? As regards the originality of this device we call the attention of our readers to a similar locking device which was used by Doctor Fernald and published over six years ago in the first volume of the *International Journal of Orthodontia and Oral Surgery*. The plan of having a flange to lock the two parts together was also used by Doctor Fernald. There is practically nothing new and original to this device which had not been shown five years before the patent was granted.

The next patent, No. 1,304,722, is a locking device. This patent contains a statement as to the object of the invention which is more or less enlightening.

In none of the patents which we have reviewed, do we find that the inventor makes the plea that he is desirous of advancing the science of orthodontia and rendering a service to humanity.

Under the heading of objects, we find this quotation ". . . which couplings may be made and sold independently of the arch wire. . . ."

In obtaining these patents, we have often wondered whether inventors have not been influenced more by the possibility of the sale of the appliance than by the advancement of the science of orthodontia. The locking device in this patent is practically a reversal of parts as shown in the previous patent.

Patent No. 1,304,723 is also a device for locking lingual or labial wires to the teeth, and while ingeniously constructed, has no practical advantage over a large number of other locking devices, which are in use.

In fact we more or less question the practicability of all of these locking devices, and whether they will be placed on the market is a question that remains to be answered.

It is our intention to review from time to time the various patents that are granted, covering the fields of orthodontia, oral surgery and radiography, and believe that such a review will be of interest, at least, to a few of our readers.

The American Society of Dental Radiographers

SEVERAL attempts have been made at various times to perfect a Society of Dental Radiographers which would be representative of the men engaged in the practice of that specialty. Most of these efforts have been more or less the work of a single individual, and the results have not been conducive of the greatest good as regards a National organization. In order to overcome this objection an organization was perfected in Milwaukee, composed of men from different parts of the country extending from the Atlantic to Pacific Coast, and from the North to the South.

The organization was composed of men who had attained prominence as dental radiographers. The purpose of this organization is to work for the advancement of Dental Radiography as a science, to study ways and means of improving technic so the science can be standardized. Also to use means for promoting dental radiography as a specialty of dentistry, and to make the dental profession realize that radiography is a profession and not a commercial art that can be practiced by any one who has a knowledge of electricity and photography.

We believe that by united effort of the dental radiographers, this specialty of dentistry and medicine can be brought to a much higher position than it now occupies because many men of the profession do not realize the true significance of radiography.

Band Materials

IN THIS issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND ORAL SURGERY will be found an article by Dr. Herbert A. Pullen dealing with band materials and band technic. This article is a plea and an attempt by Doctor Pullen to standardize band materials and technic. Any effort to standardize any technic is a commendable act. However, some of the things advocated by Doctor Pullen are so at variance with the practices and beliefs of other men that we cannot allow this article to remain as giving forth ideas as held by all of the men practicing orthodontics.

The first plea which Doctor Pullen makes for the standardization of band materials is the use of gold and platinum. This band material in our hands has proved entirely unsatisfactory, both in private practice and clinical work. We have tried every alloy of gold and platinum that has been placed on the market, and it may be possible that Doctor Pullen has a special alloy of this material that we have not tried, but unless such is the case, we unreservedly condemn the use of gold and platinum as the ideal band material. In our experience it has absolutely nothing to recommend it over other materials. So far as strength is concerned, we have not found it superior, and in fact it is inferior to many alloys of nickel silver and aluminum bronze. It does not possess the edge strength to withstand the stress of mastication and neither can it be used thinner than the alloys of nickel silver or aluminum bronze. In fact we have been using a band material from an alloy worked out by

Doctor H. C. Pollock, of St. Louis, which contains a high percentage of nickel and which is far superior to gold and platinum in every respect except color. This band material which Doctor Pollock has experimented with, takes on a color in the mouth similar to blue steel and beyond that point does not oxidize or corrode more than gold and platinum. This nickel band material stands up as well as iridio-platinum. It has been given a severe test in clinical cases.

The qualifications of a good band material as named by Doctor Pullen are (1) high fusing point; (2) noncorrosive and nonoxidizing; (3) a good edge strength; and (4) the capability of being easily burnished to the tooth.

Gold and platinum fails in all of these requirements except the fourth. That it succeeds in the fourth is the one reason why it fails in other requirements. Gold and platinum does not possess a fusing point sufficiently higher than the nickel alloys to give it any practical consideration. As regards noncorrosive and nonoxidizing, no band material exists which will not discolor in some mouths. We have seen iridio-platinum band material discolor in the mouths of patients, or at least some sort of deposit forms on the band material which is black. As regards edge strength, we have said before that gold and platinum alloy does not possess sufficient edge strength and is far inferior as regards edge strength, to nickel silver and especially those band materials containing a high percentage of nickel. As regards the fourth requirement, any band material that can be easily burnished to the tooth is too soft to stand the stress of mastication. We admit that a band can be made out of materials that burnish to the tooth, but after six or eight months of use in the mouth, subject to the various stresses of mastication, we find the band in a decidedly unsatisfactory condition.

As regards the statement that a band can be perfectly fitted and contoured, that is only a question of judgment, because we do not believe it is possible to ever "perfectly" fit a band. We believe a band material should be sufficiently rigid to make burnishing and contouring difficult, and the band can only be accurately fitted by the employment of a certain amount of skill and technical ability which comes only as a result of giving careful attention to details.

Any band material which is softer or which can be in contour more easily than iridio-platinum is too soft. Band materials having the working quality of iridio-platinum can be produced from nickel silver or alloys with a high percentage of nickel which is proved by the alloy that Doctor Pollock has produced.

In making a plea to standardize the construction of bands, we believe it is an unscientific thing to fit bands by trial. We are aware of the fact that a number of men have formed a habit of having a large stock of ready made bands, and selecting the band which goes over the tooth and seems to fit the most closely of any band they have in stock. Such a band will only attain a certain degree of accuracy.

In regard to the seam of the band, we do not believe that the seam of all

bands should be placed at the buccal side, but rather agree with Doctor Mer-shon's suggestion and practice, that the seam should be placed on the lingual side of the maxillary molar band, and on the buccal side of the mandibular molar band because of the anatomic shape of the teeth. Doctor Pullen's statements that at no point should the band be allowed to cover the occlusal surface may be misinterpreted. We believe that a band must fit the occlusal constriction in such a manner as to prevent the band from slipping gingivally and the amount of occlusal constriction on a molar is a portion of the occlusal surface. The necessity of having a band fit this occlusal constriction can be easily realized by studying the shape of a band swadged over a metal tooth. When band technic is standardized, we hope this standardization will not include the use of ready made bands which are to be condemned because they will lead to careless technic of band fitting and while the use of a seamless band may be a time-saver, it will not be conducive to the best band technic. Before any one adopts the use of gold and platinum as the ideal band material from the standpoint of efficiency, we would suggest that they perfect a technic so that they can work iridio-platinum or alloys of the materials which have a high percentage of nickel. It will be found that a band made from either one of these last-named materials will have a higher degree of efficiency and usefulness than a gold and platinum band.

Dental Welfare Foundation

FOR a number of years men in the dental profession have considered the necessity of supplying dental information to the public in such a way as to show the evil effects of decayed teeth, and also of the benefits that could be secured to the general health by having the mouth and teeth in a good condition.

There is no doubt that it would be a desirable thing if a certain amount of dental information could be made available to the public so as to inform them of certain anatomical needs that are essential to the preservation of the teeth.

The public should have information regarding the deciduous teeth, as to the time of eruption and time of being lost, and also some information in regard to the permanent teeth, especially the eruption of the first permanent molar.

After a number of years of experience in dental clinics, we realize that many people do not know that the first permanent molar is a permanent tooth; consequently the tooth is decayed and lost before the parent is aware of the evil results that are being accomplished. Many mouths, from the standpoint of normal mastication, are ruined early in life because of the loss of this tooth.

This and other information which the public should have, has not been available up to the present time. The difficulty was that no suitable plan had been proposed or suggested for the dissemination of such knowledge without resorting to some means that are rather questionable from the professional standpoint.

The problem has been solved by the organization of the Dental Welfare

Foundation. They have perfected a plan, which has the sanction of the National Dental Association, for the spreading of dental information among the public that will not be a financial hardship on any one individual dentist, but which will be a benefit to the dental profession because of its wide distribution.

The plan of the Dental Welfare Foundation is being made known to dentists through the organization, and it only remains for us to endorse.

We believe the plan should be given a whole-hearted trial during the first year. At the end of that time, the profession will know whether it has met the success the organizers foresaw. If it has, everyone will be ready to support such educational work for many years to come.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

The Fifth Red Cross Roll Call

Announcement has been made by the American Red Cross that it will hold its Fifth Annual Roll Call during the two weeks from the 11th to the 24th of November. During that time it will call upon the American people, collectively and individually, to join the organization as members. It will ask them to pay their dollars for the support of its peace-time work.

This work includes the establishment of health centers, the appointment of public health nurses, preparedness for Disaster Relief, instruction in First Aid, Food Selection, Life Saving and in Home Hygiene and Care of the Sick, and medical relief for the hundreds of thousands of destitute children in Central and Eastern Europe.

Not only is the Red Cross work with the standing Army and Navy being continued, but owing to the continually increasing number of disabled ex-service men, 2,397 Red Cross chapters are maintaining a service for ex-soldiers and sailors. There were last year 1,550,580 cases of service by chapters to such men, and headquarters handled 148,000 allotment, compensation and insurance claims. The Red Cross spent last year for the disabled men alone \$10,000,000.

Yet it took in last year in dollar membership dues only \$6,000,000. Obviously if the work is to be continued to meet the need that exists, the membership must be greatly increased during the forthcoming Roll Call. It is hoped that those who realize the value of public health work will make it their business to join and to persuade their friends to join some time between the dates mentioned.

Chicago Dental Society's Annual Clinic

The annual clinic of the Chicago Dental Society will be held at the magnificent new Hotel Drake, January 19, 20, 21, 1922.

This hotel is peculiarly well adapted to the needs of a large sectional meeting as has been planned for this occasion. Many commodious sound-proof rooms will be provided for the lectures and demonstrations, while the

space for the general sessions and exhibits will meet all requirements, and is ideal in every particular.

The program, which will be announced at a later date, will surpass anything yet attempted by this component society.

For convenience, out of town guests should make their reservations at the Drake, and they should be made as early as possible, as there will be a large attendance from outside Chicago. All ethical dentists are cordially invited.

Further information will be cheerfully given by addressing—M. M. Printz, Secretary, 25 E. Washington Street, Chicago.

Notes of Interest

Dr. Harvey A. Stryker formerly practicing in Rochester, N. Y., has located at Santa Ana, California, having just recently favorably completed the California State Board examination. He has offices in the Spurgeon Building.

Dr. A. V. Greenstein is located at 176 West 87th Street for the exclusive practice of orthodontia.

Dr. George A. Barker, formerly associated with Dr. H. L. Morehouse, Spokane, Washington, announces the opening of offices at 515 Joshua Green Building, Seattle, Washington, for the practice of orthodontia exclusively.

Dr. A. J. Labbe announces the opening of his office for exclusive practice of orthodontia, 419 South Capitol Ave., Lansing, Michigan.

Dr. Carl N. Dorman has associated with Dr. Carl O. Engstrom for the practice of orthodontia at 306 Hagelstein Building, Sacramento, California.

Dr. A. S. Ingman announces the opening of his offices, Suite 322-4 Francis Building, Louisville, Ky. Practice limited to orthodontia.

Dr. R. G. Brodeen announces the opening of a dental office at 925 Payne Ave., St. Paul, Minn., with Dr. V. L. Satterlund, physician and surgeon.

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ORIGINAL ARTICLES

THE TEMPOROMANDIBULAR ARTICULATION IN THE DISTOCLUSION CASE*

BY A. LEROY JOHNSON, Sc.D., D.D.S., BOSTON, MASS.

THERE is nothing novel to this Society in a discussion of the problem of the temporomandibular articulation in the distocclusion case. It is a subject that has been treated many times. I am here in order to comply with the request of the committee and not because I have a very definite contribution to make. In the literature very positive claims have been made as to the nature of changes resulting from treatment, although the evidence presented is not at all convincing. Some say they know that in certain cases the mandible has come forward, and also that in a mesiocclusion case it has certainly jumped back. However, until such statements are supported by data of a more reliable nature than that of personal observation of an isolated case or two, they should not take precedent over logic built upon the study of the evolution, racial and individual, and of the structural constitution of the parts involved. Inasmuch as the burden of the proof rests upon the one who makes the claim, and as substantial evidence has not as yet been produced, the fact is that knowledge relative to changes in the temporomandibular is very limited. I shall only present a brief criticism of the evidence upon which the belief is based that changes in the temporomandibular articulation constitute such a vital problem in the distocclusion case.

Change in the temporomandibular articulation resulting from treatment can be interpreted in either one of two ways; either as an alteration in the relations of the head of the condyle to the glenoid fossa, or as a harmonious modification of the joint as a whole. The latter, for example, would be comparable to the effect produced by compressing and stretching a rubber image; while the former refers to a physical translation of parts.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27-30, 1921.

Little evidence can be found to substantiate the assertion that the condyle is ever actually brought forward in the glenoid cavity and made to stay forward as a result of treatment; that there is in reality a permanent physical translation of parts as a result of treatment. Paleontology and Embryology contribute nothing to support this view. But in the anatomic organization of the joint it is perhaps possible to find partial explanation of the change that seems apparent in clinical observations, and which has led many to believe that the condyle is moved forward on the eminentia as a result of treatment.

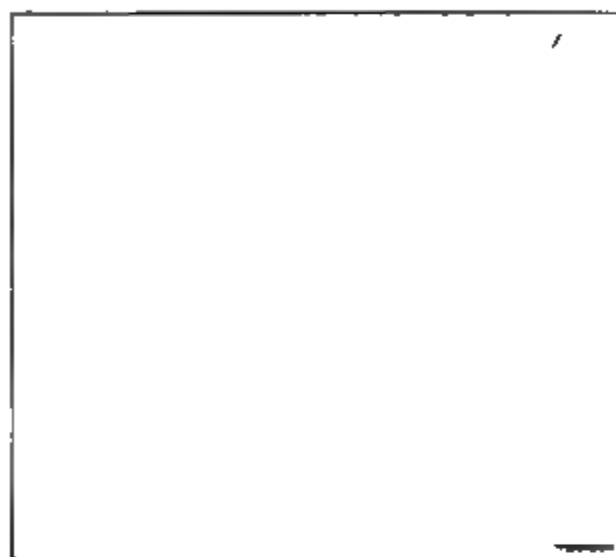


Fig. 2.—The mandibular articulation from the side. (Drawn by A. K. Maxwell.) (*Quain's Anatomy.*)

Fig. 1.—Sagittal section of the temporomandibular joint of the right side. (Allen Thomas.) (*Quain's Anatomy.*)

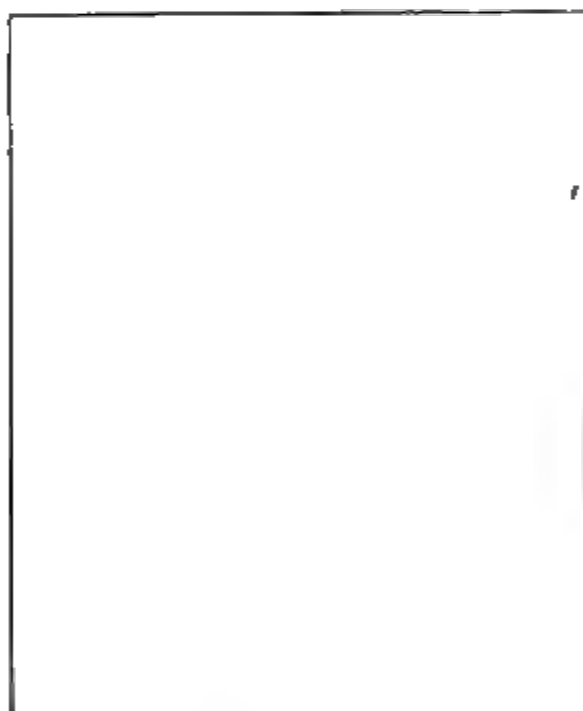


Fig. 3.—The mandibular articulation and accessory ligaments from the medial aspect. (Drawn by A. K. Maxwell.) (*Quain's Anatomy.*)

I shall not attempt to review the anatomy of the temporomandibular articulation, as this has been so well done by Cryer, Dewey, Prentiss and others. Our interest lies in that part of the field of anatomy which throws light upon the phenomena manifest in the occlusal relations of the teeth which seem to indicate conditions in the joint.

Piersol says of joints in general: "The opposed ends of the bones are coated with hyaline articular cartilage which gives smoothness to the articular surfaces. Although following in the main the bony contours, the cartilage does not do so accurately; details are found in the cartilage that are obscure

in the bones. Although the shapes of the articular ends determine the character of motion, it is important to recognize that the opposed surfaces are not so accurately in apposition that irregular movements cannot and do not occur. Failure to recognize this fact has given rise to much difficulty in accounting for motions that undoubtedly take place, but which, according to the mathematical conception of the joint, are impossible. Furthermore, the range of individual variation is great, just as a man may have a long or a short head, so the articular ends of the bones may depart considerably from typical proportions."

The temporomandibular articulation is a compound joint, the elements

A

B.

Figs. 4A and 4B—Head of a fetus of 42.5 mm., seen *en face* and in profile. X 2.5 (After Retzius.) (Keibel and Mall.)

Fig. 5.—Head of a fetus of 117 mm., in profile, Natural size. (After Retzius.) (Keibel and Mall.)

of which are the socket, the condyle, and the meniscus, an interarticular disk of fibrocartilage, dividing the cavity into an upper and lower part, both being enclosed in a capsular ligament. Movements occur on both sides of the meniscus which gives to this joint its great freedom of movement. Many attempts have been made to analyze the movements of the parts in mastication. But it should be clear to all that the knowledge of such movements derived from the study of the structural formation of the parts of the dead subject will naturally be very indefinite. The character of the joint, and the great range of variation in the conformation of its elements, precludes precise delineation of its movements.

J. Leon Williams has recently published an interesting investigation of the relation of the articulating plate of the glenoid fossa in the resting position of the condyle. He "selected skulls of a number of races in which dentures were sufficiently good to insure normal resting occlusion," and made modelling compound impressions of the glenoid cavity by forcing the con-

Fig. 6.

Fig. 7.

dyle into the compound in bringing the teeth into normal occlusion. He then made cross-sections which showed a wide degree of variation in the forms of the articular surfaces and the relations they bear to each other.

The wide variation in the structural conformation of the joint, together with the natural freedom of movement peculiar to it, makes liable the unex-

pected. And this fact must be taken into consideration before it can reasonably be claimed that because a particular movement of the jaw cannot be explained by a study of the mechanics of typical conditions that the condyle has been physically changed in its relation to the glenoid fossa. A great latitude and freedom of movement of the mandible is possible within normal physiologic limits.

The anatomists tell us that the mandible is held in position by the ligaments, muscles, atmospheric pressure, and cohesion. The ligaments are lax. They define certain limits of movement, and are the principle of protection against dislocation and displacement of the joint. The muscles are the most efficient means of holding the mandible in position. Atmospheric pressure, although an influence, is not very efficacious; it keeps the soft parts applied to the bones. Cohesion probably has an appreciable effect through the action of the viscid synovial fluid. Thus of the factors commonly designated as holding the mandible in place the muscles are the most important, and so con-

Fig. 8.

stitute the dominant force in determining its position. The ligaments mark the limit of normal muscular action.

The capsular ligament arises from the periosteum near the border of the articular cartilage. This ligament, like the others which enter into this articulation, is constituted of white nonelastic fibers.

“Sudden strain upon the ligament will either have no effect or will rupture some of its fibers and perhaps injure the adjacent joint surfaces.” (Starling.)

Nor are the ligaments as susceptible to environmental influences as is osseous tissue; they are not plastic as bone is plastic; they are of a more stable nature. With regard to cartilage it is well known that the “growth and multiplication of cells is an extremely slow process—slower than in any other tissue of the body.” (Keith.) Muscle tissue is a physiologically more active structure than any of the connective tissue derivatives. It, in a measure, di-

rects the development of bone. Moreover, the tonic contraction of muscle tissue holds the mandible in position. The muscles "react to any sudden increase in their tension by an equally sudden contraction. This saves the joint from dislocation before the central nervous system has even become aware of the strain." (Starling.) It is not necessary to present in detail the evi-

Fig. 9.

Fig. 10.

dence in the support of the belief that the relation of the condyle to the glenoid cavity, in the sense of there being a physical translation of parts, is not changed in the treatment of the distoclusion case, inasmuch as such evidence is the common knowledge of the anatomy and physiology of the structures which make up the articulation.

Whether there is ever a harmonious modification of the joint as a whole, as a result of the redistribution of forces resulting from treatment, is another matter. From the nature of connective tissue structures it seems as though this might be possible. Yet, even so, the literature contains little direct evidence to substantiate this idea. In cartilage, reproduction and growth in the cells bear a definite relation to the normal stresses and strains of force. "Certain strains are necessary to call forth the growth energy of cartilage cells." (Keith.)

We note at times that following the development of the upper dental arch by means of appliances the lower teeth seem to come forward from a distal occlusal relation to normal unassisted. Before attributing this apparent readjustment to a change in the temporomandibular articulation we should recognize the fact that such change in the relation of the mandible to the maxilla is in harmony with normal growth processes. In these cases where

Fig. 11.

the change becomes permanent it is not necessary to assume the forward movement of the condyle in the glenoid fossa.

That the forward growth of the mandible is a natural process is evident in a study of the embryology of parts.

Keibel and Mall: "Fetus 42, 5 mm. in length, and estimated at nine weeks old. In profile view the great development of the forehead region is striking; and below this the root of the nose is deeply depressed. The nose is still low, but the jaws and chin are well marked. The nose is very broad in proportion to its height, and the external nares are closed by the epidermal plugs which are continuous with an epidermal thickening of the upper lip."

Keibel and Mall: "Note especially the projecting upper lip and the receding chin, the double upper lip and the shape of the nose. The prima has almost the position it holds in the adult. In the first half of the third month the two lips project equally, but later the border of the upper lip

and the lip itself grow more rapidly, so that in the fourth and fifth months it projects markedly beyond the lower lip; by a stronger growth of the lower jaw and lip this difference is gradually overcome in the sixth to the ninth months, but by a kind of inhibition process the early fetal arrangement may be retained in the adult to a marked degree."

Thus do we find in the study of natural processes conditions which throw

Fig. 12.

Fig. 13.

light upon the derivation of certain abnormalities of form, and also, an explanation of changes which otherwise seem most obscure.

Although measurements made from more stable points of the skull, as the external auditory meatus, show a relative change in the position of the chin as a result of treatment it is not rational to assume a change in the temporomandibular articulation, because the osseous tissue in other parts of the mandible, especially the neck of the condyle below the capsular ligaments

and the angle of the jaw, are from their nature more susceptible of modification than the joint. In fact the weight of the evidence indicates that the joint is less liable to change than is the mandible itself.

In the study of the phylogeny and ontogeny of the dental apparatus we find that the teeth develop first and the jaws later to support them; that the temporomandibular articulation is a comparatively recent acquisition in the

Fig. 14.

Fig. 15.

vertebrate anatomy, necessary for stability of attachment; and that there is evident in different species a direct correlation between the formation of the temporomandibular joint and the character of the teeth and occlusion. Now such knowledge is a basis for the interpretation of variations and changes expressed in species but in the consideration of the individual organism we must remember that although the tooth is phylogenetically the dominant structure of the dental apparatus including the temporomandibular articula-

tion, the jaws and joint are now racial characters of the individual organism; they are essential units in the organization of the whole. People without teeth, and who have never had them, have jaws and the temporomandibular joint. Thus even though the correlation between the character of the joint and the teeth is so striking in the comparison of the different species, it does not constitute a principle upon which to assume that the change in the occlusal rela-

Fig. 16.

Fig. 17.

tions of the teeth of an individual in the treatment of the distoclusion case will cause as absolute a corresponding modification of the joint as is evident in the study of species. The question cannot be so easily disposed of. The form of a bone is determined partly by heredity and partly by the mechanical and chemical influences to which it is subjected during growth. Nevertheless, the evidence derived from Paleontology and Embryology would seem to indicate the possibility of a certain degree of harmonious modification of the

joint as a whole as a result of structural changes occurring in the denture. Whether or not this is true can only be determined by more extensive studies, clinical observation, and experiments than have as yet been presented to the profession.

Figs. 6 to 11 illustrate specimens presenting a variety of occlusal conditions. The temporal; pterygoids; lingual, and sublingual muscles in these specimens are undisturbed, hence showing the parts in the cadaver. Note the general form of the mandible, the joint and dental conditions.

Figs. 12 to 17 are pictures of the same specimens with the temporal muscles removed. The external pterygoids are showing.

Fig. 18 is a dried skull of a distoclusion case. Note the relation of the head of the condyle to the glenoid fossa and external auditory meatus.

These specimens are too few in number to be accepted as conclusive evidence of the relation of dental conditions to the joint. However, the extreme characteristics manifest make them interesting material for study. Note the

Fig. 18.

variation in the general form of the mandible, especially in the region of the neck of the condyle, in contrast to which is a certain stability in the forms and relations of the parts which make up the joint. Such evidence as this in the light of the anatomy and physiology of the parts puts the burden of the proof squarely up to those who claim that the head of the condyle is brought forward to a new position in the treatment of the distoclusion case.

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DISCUSSION

Dr. Milo Hellman, New York City, was asked to open the discussion. He said: I hasten to open the discussion because I want to pay my compliments to Dr. Johnson for the illuminating results in the work he has done. I also want to state that the results not only coincide very largely with those of my own work and investigations along these lines, but they also verify and corroborate my findings.

The lack of change in the temporomandibular articulation I can substantiate from an examination of a number of skulls exhibiting Class II, Division I, manifestations. The series of skulls, come from the same locality and have the same racial and physical characters. They show the same variability in form and position of the condyles and the temporomandibular articulation shows no difference from those in normal occlusion and yet they are in distoclusion, i. e., Class II, Division I.

I wish to thank Dr. Johnson and express my gratification at having seen the illustrations of the specimens.

Dr. Irving Spenadel, New York City.—I would like to relate briefly some observations that I made with Dr. Sullivan, Anthropologist of the American Museum. These observations were interesting. A number of skulls were examined which showed mutilations on one side of the jaw varying from two to eight and ten teeth to none on the other side. However, the point of greatest interest to us was the fact that there was no change in the glenoid fossa itself when compared to the fossæ of skulls which had no missing teeth and appeared normal.

On the other hand the change that was most striking in the mutilated skull was the heavier and thicker neck, a broader and flatter condyle where mastication was greatest as compared to a thinner neck and narrower condyle where mastication was poorest. There was no change in the glenoid fossa itself of any of the skulls examined.

Dr. V. E. Barnes, Cleveland, Ohio.—I would like to ask Dr. Johnson to answer, or to investigate later if he will, whether he has ever noted in studying articulations any cracking sound in the temporomandibular articulation?

I have often noted a characteristic cracking noise associated with it. This cracking seems to develop after nine years of age and increases in degree to maturity. This cracking sound has been decidedly lessened by expansion of the maxillary mandibular arches. Some relief has been afforded by extracting impacted lower third molars. Just what could have happened in such cases to cause this cracking sound, I cannot suggest. I do not know, positively what the cracking condition is, but I know it exists and has been relieved or apparently cured by expansion laterally *without* posterior movement of the teeth or without extraction of any teeth. In other cases no relief could be noted except after extraction of impacted teeth. In six cases I have relieved all cracking by such extraction. I submit this start for further observation.

Dr. Frank A. Delabarre, Boston, Mass.—There has been a picture shown here today of a skull from Dr. Cryer's collection which I think I recognized, where there was a unilateral dislocation of the mandible. I have previously examined this skull with the view of studying the symmetry of the ramus and condyles, and they showed a very great asymmetry in size, shape, and form which, personally, I interpreted to have been a change that took place subsequent to the dislocation. It would seem to have some bearing on the question of change in the articulation. If such an extreme modification was produced by a changed environment, why can we not expect lesser changes to occur in this region when we change the environment by jumping the bite.

Dr. A. Leroy Johnson, Boston (closing).—In reply to Dr. Barnes' question, in the dead subject the joints cannot be moved to any extent so long as the muscles are attached. Dissection is not a satisfactory way to study this problem for the reason that the bones cannot be moved with the soft parts attached, and when the soft parts are removed the relation of the skeletal units is lost.

THE POSTOPERATIVE TREATMENT OF CLASS II*

BY C. A. HAWLEY, D.D.S., WASHINGTON, D. C.

IN CONSIDERING the postoperative treatment of this class, the general principles of retention as affecting all classes of malocclusion will not be reviewed except as they apply in some especial way to this particular class.

Retention is the exercise of either an active or a passive force as a means of combating the retroactive forces that tend to induce teeth that have once been moved to return to their former positions. Postoperative treatment includes other means of maintaining a corrected occlusion.

We might enumerate the necessary retention in this class as follows:

- I. Maintenance in proper position of teeth that have been rotated.
- II. Maintenance of the proper inclination of the incisors.
- III. Maintenance of the overbite.
- IV. Maintenance of the exact corrected sizes and forms of the arches.
- V. Maintenance of the normal mesiodistal relation as corrected from distal occlusion.

Only the last is peculiar to this class alone, the others occurring also in other classes of malocclusion.

As to the first, the retention of teeth that have been rotated, we have the same problem in this class as in all others and the method requires no especial consideration. It is usually accomplished by banding the teeth, using spurs soldered to the bands and resting on the adjoining teeth in such a way as to counteract the retroactive force of rotation.

Second, in the majority, if not all, of Class II cases, there is an abnormal inclination of the incisor teeth. In Division I they have an outward and in Division II an inward inclination. The mechanical retention in Division I has usually been accomplished by the high Lourie wire with finger springs, accompanied by a lingual wire resting at the gingival, or by a lingual wire lying at the linguogingival border and a labial wire resting near the labial incisal edges, both soldered to canine bands. This mechanical retention should be succeeded by exercises to strengthen the orbicularis oris muscle and the abandonment of all lip-biting, thumb-sucking or similar habits.

In III, the maintenance of the overbite, we must assume at this place that it has been corrected during treatment, although the bite-plane, the universal appliance for its retention, is also used for its treatment during the first stages

*Read before the American Society of Orthodontists at Atlantic City, N. J., April 27, 28, 29, 30, 1921.

of retention. We can only consider retention proper, however, when the condition is reduced to normal. The usual method of retaining the overbite is some kind of bite-plane, either a solid plane attached to bands on the maxillary incisor teeth or in the form of a skeleton wire, loops also soldered to bands or to the lingual wire. The object of the wire loops is to prevent the proliferation of the gum tissue, which often occurs under a solid bite-plane. The author has also used single wire loops attached to the individual teeth, thus permitting considerable individual movement of the teeth, as rotation, when the bite-plane is desired during the treatment.

The importance of IV, the maintenance of the exact corrected sizes and forms of the arches, can hardly be overestimated, for upon its success often depends the success of the retention of the mesiodistal relation.

In a neutroclusion with normal arch forms, the occlusal lines if superimposed upon each other will be a uniform distance apart, approximately twelve-one-hundredths of an inch, throughout the whole arch forms; the arch form of the mandibular, of course, lying on the inside of the maxillary. This uniform relation of about twelve-hundredths of an inch between the lines of occlusion of the maxillary and mandibular obtains in all neutroclusion cases and may be called the *harmony of the arches*, and is necessary for a perfect interdigitation of the cusps. Now if the mandibular arch remains normal or the same size and the maxillary becomes narrowed, the mandibular, in order to obtain this harmony in the molar and premolar region, must move backwards to find a comfortable occlusion. This action carries the lines apart in the incisal region, exactly what happens in posterior-occlusion cases. Of course, the mandibular arch in these cases is not always normal and must be widened, but always the maxillary must be widened more than the mandibular.

With this in mind, it can be seen how important it is that the maxillary arch be successfully retained, for if it once commences to narrow, the mandible will be likely or sure to seek again its distal position. Unfortunately, we generally have associated with this class adenoids and nasal and throat disturbances, which may persist long after orthodontic treatment has been concluded and exert a retroactive effect upon the arch. So while the widening of the maxillary arch in this class confers great and lasting benefits, it must also be understood that it renders the retention more difficult. In Class I, or neutroclusion, the results of the narrowing of the maxillary arch after retention is removed, are not the same. The mesiodistal relation not having been changed, the narrowing maxillary arch usually carries the mandibular with it, with no change in the mesiodistal relation. Also there are usually no lingering nasal disturbances which stimulate this tendency.

The *crux* of the situation in this class is, of course, the retention of the mesiodistal relation. In discussing the retention, it is presumed that in the treatment, the mesiodistal relation has been thoroughly established, either by intermaxillary elastics, or muscle exercises, or in many cases, when the maxillary arches are widened so that the arches are in harmony, the normal mesiodistal relation is automatically resumed. If this relation is well established dur-

ing treatment, the overbite normal, and there are no interfering cusp relationships, very little mesiodistal retention in itself will be required in the majority of cases, and the most important retention required will be that to maintain the harmony of the arches. For this purpose the soldered or removable lingual wire may be used, accompanied with a bite-shelf if the overbite has been abnormal. In cases that show a persistent tendency to return to the former distal relation, arrangement should be made for the use of light intermaxillary elastics for a long time, and the muscle exercises should be faithfully adhered to.

On account of the long retention, especially of the maxillary teeth, often necessary in this class, I have been more successful with the removable retainer, which has previously been described before this Society. The great advantage is that, while successfully retaining all the malocclusions of this class, viz: rotated teeth, the inclination of the incisors, the overbite and the width of the arches, it is removable and patients are content to wear it the necessary length of time. Its weak point for this class is that it can have no provision for intermaxillary rubbers. These, however, in most cases can be superseded by the bite-plane and muscle exercises. In cases of persistent tendency to recede, fixed retention can be worn for six months or a year, then succeeded by the removable retainer.

I have spoken in other papers of the advantages of this retainer from a hygienic standpoint and of the great advantage of having the teeth free from bands during retention. In this class its advantage lies in the fact that retention can be kept up for so much longer time without danger to the teeth and without disagreeable disfiguration of the patient.

Great emphasis must be placed upon the removal of slight interferences in the occlusion, upon the abandonment of deleterious habits, upon the use of Dr. Rogers' muscle exercises and the conscious effort to bite forward in the proper occlusion until the inclined planes and cusps of the teeth are firmly and accurately settled into place, and the muscles have strengthened and developed to the natural tone and function.

There are, no doubt, cases that have reached or passed maturity where the cusps of the teeth have been worn smooth, in which it would be unwise to attempt to change or retain the mesiodistal relation. In this paper I have been referring to cases younger than about eighteen and where the cusps and fissures of the teeth have not been seriously mutilated.

As to the matter of the influence of inheritance on the retention of this class of cases, I have never yet in my own practice been able to discover this influence to such an extent as to interfere with their final successful retention. Nor do I know of any orthodontist, except Dr. Case, who has noted such influence to any great extent. I do not question, however, the influence of heredity as a causative factor in this class and all other classes of malocclusion. Normal occlusion, however, has been inherited by the human race for tens-of-thousands of years, and the influence toward normal occlusion seems potent enough to overcome and upset the persistency to return, when these abnormal conditions have been removed by proper treatment.

DISCUSSION

Dr. Samuel Herder, New York, N. Y.—I would like to ask a question with regard to muscular exercises. I have been quite interested in Dr. Rogers' work along the line of exercising the muscles of the face, and I feel that most of the men here would be glad to know what Dr. Hawley does and his exact process of exercising the muscles of the face and jaws to develop them in Class II cases or other cases. I would like Dr. Rogers to say something himself on this subject, but I feel Dr. Hawley could help us out, as he mentioned the subject in his talk.

Dr. Hawley.—In that work I am simply a pupil of Dr. Rogers, and as Dr. Rogers is here, I would much rather he would answer the question himself.

Dr. Waldron.—Dr. Hawley in the beginning of his paper gives us a definition of retention, and admits of a passive and an active force, and in addition states that postoperative treatment includes other means of maintaining a corrected malocclusion.

He further enumerates five requisites in the retention of this class of irregularities which are as follows:

- I. Maintenance in proper position of teeth that have been rotated.
- II. Maintenance of the proper inclination of the incisors.
- III. Maintenance of the overbite.
- IV. Maintenance of the exact corrected sizes and forms of the arches.
- V. Maintenance of the normal mesiodistal relation as corrected from distal occlusion.

These various steps in his so-called postoperative treatment, come under this active or passive retentive force or both, and are therefore covered by his definition of retention.

Now these so-called retaining appliances do not retain, and the occlusion is generally improved during the period of time these appliances are worn, due to the various forces of occlusion functioning. The appliance meanwhile prevents the teeth from returning toward their original positions.

In view of these facts that term "Post Treatment Maintenance of Mal-Occlusion," which this Society adopted last year to replace the term "Retention," more fully covers this subject, and should be used until a better terminology is adopted.

Therefore, I sincerely hope every member of this Society will use the nomenclature adopted by the American Society of Orthodontists.

The author has well covered the ground in his explanation of these five essentials for the proper maintenance of normal occlusal relation after treatment of these distocclusion cases have been completed, and he favors the removal maintenance appliance which he introduced to this Society a few years ago as the one best suited.

He says it has two weak points, and these are its failure to maintain rotated premolars in the mandibular arch, and its lack of provision for intermaxillary elastics.

These are easily overcome; instead of banding the mandibular premolars and soldering a lug perpendicular on the lingual surface of the band, this lug fitting into a slot in the vulcanite portion of the appliance, as recommended by the essayist, you can band these premolars and have a horizontal lug or spur soldered to the band on its buccal surface and extending mesially and distally to the adjacent teeth and resting against the latter.

This will maintain the rotated teeth in their new positions, and will not interfere with the removable maintenance appliance when inserting or removing the same.

Hooks for intermaxillary elastics can be soldered at convenient points on the maintenance appliance, and the latter can be stabilized by banding the first maxillary premolar and soldering a horizontal lug to the band on its buccal surface, which will prevent the clasp of the appliance from slipping off the banded tooth. This will not elongate the banded premolar unnecessarily, as the occlusal contact with the first and second mandibular premolars will prevent this.

It has been my experience in some older cases where the cusps of the molars and premolars are not so pronounced, and there is a tendency for the mandible to seek its former distal position, that it is unwise to use a lingual wire for the maintenance of the mandibular teeth, and a Hawley application on the maxillary teeth, because the bite-plane on

the maxillary teeth will maintain the mandibular incisors, but the premolars and molars seem to settle back leaving a space between the mandibular first premolar and the canine.

This however, can be overcome by using a Hawley appliance on both maxillary teeth and mandibular teeth, the mandibular labial wire preventing the mandibular incisors from moving forward, and vulcanite festooned about the lingual surfaces of the molars and premolars will prevent them from moving distally.

We all agree in the treatment of distocclusion cases that we usually accomplish the following:

- I. Equalize maxillary and mandibular arches.
- II. Bring the mandible forward.
- III. Change the angle of inclination of the incisor teeth, (Maxillary and mandibular).
- IV. Correct the supraocclusion of incisor teeth if necessary, (Maxillary and mandibular).
- V. Induce vertical development of premolar and molar area, (Maxillary and mandibular).

With these forms of postoperative maintenance appliance as devised and recommended by Dr. Hawley, we can maintain and sometimes correct several of the above steps which are necessary requisites in the treatment and maintenance of distocclusion cases.

Dr. C. A. Hawley, Washington, D. C. (closing).—There is practically nothing further I wish to say in regard to the muscle exercises. This subject is very clearly and completely covered in the admirable papers by Dr. Rogers.

In regard to what Dr. Waldron said about bands on the mandibular premolars, I have practically abandoned these slots myself. I find a spur on the buccal surface is better. However, that is a mere detail. While I think very highly of a lower removable retainer, yet it is more difficult than an upper. If you are using a lower retainer at the same time with a bite-plane, there can be no protrusion of the mandibular teeth, as they are held in place by the labial wire. Every year I use this retainer I am more and more impressed with its desirability in this class of cases on account of the possibility of the long retention necessary. It is surprising to me how quickly patients will grasp the theory of this retainer and understand the principal points of its use. Patients come to me and say, "I have experimented; I have left it out so long; it would not work. I am not going to leave it out so long again." Or, "I have left it out two weeks and it is all right." They grasp the idea of keeping them as an index of the positions of the teeth. I have been much gratified to see how quickly they grasp the principle. Also, I am impressed more and more with the potency of small interferences with the cusps, that is, in the necessity of removing all slight interferences. In that connection, one value I have found in removable retention is that the molars have a certain freedom of movement in settling to place. I have several cases where when I retained them I found I did not get the exact relations of the arches, and so I left the maxillary retainers off for about a week, and then trimmed the retainer slightly and put it back in. The cusps moved into perfect adjustment. Sometimes I make a new one after a week or two and let the teeth settle exactly and accurately in their proper place.

In illustration of the effect of slight interferences, I had two months ago a case thrown into distocclusion from the rising of a mandibular second molar from pressure of an impacted third molar. This molar was pushed upward in the socket. It was thrown against the distal surface of the maxillary first molar, and it caused the mandible to move back. I had the third molar removed, expecting that the second molar would settle down, but it did not do it, and as the boy was going away to school, I ground some of the enamel off the maxillary tooth and dismissed him for a week. When he returned, the bite was back into proper place. I found in one case an erupting third molar, where the second molar had been extracted, was coming forward with the inclined occlusal surface against the maxillary teeth, throwing the mandible back. When the third molar was straightened up the jaw came forward again. These interferences are very important in this class of cases.

REPAIRING LINGUAL ARCH WITHOUT REMOVING MOLAR ANCHOR BANDS*

BY HERBERT A. PULLEN, D.M.D., BUFFALO, N. Y.

IT is frequently necessary to make repairs upon the lingual arch or to occasionally construct a new one upon an investment material cast made from a compound impression of the dental arch, the usual procedure requiring the removal of the molar anchor bands and their replacement in a compound impression taken just previously to the removal of the bands. These bands later appear upon the cast with the half round tubes in proper position for locking of the lingual arch for repairs, or for the construction of an entirely new arch.

The most serious objection to this method is the length of time consumed in removing the anchor bands, placing them in the impression, and recementing them upon the teeth after the arch is repaired or reconstructed.

In order to overcome this objection and conserve the time spent in removal and replacing of the anchor bands, the writer has devised a method of repro-

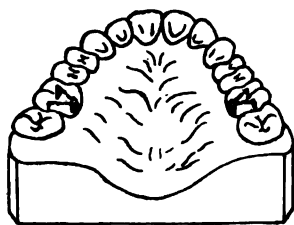


Fig. 1.

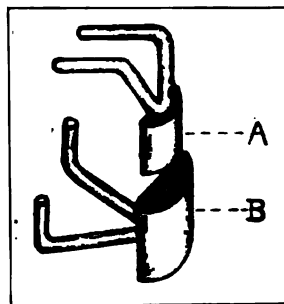


Fig. 2.

Fig. 2.—A. Half round rod with tongs to be inserted in impression. B. Half round tube with tongs to be inserted into cast.

ducing upon the investment cast the half round repair tubes only, firmly attached to the lingual sides of the molars in the exact location of the half round tubes in the mouth, as in Fig. 1, so that any repair or reconstruction work may be done thereon without removal of the molar anchor bands.

The method consists of the use of a pair of temporarily substituted rods and tubes, each with tongs attached with solder and bent internally as shown in A and B, Fig. 2. The tongs on the rod portion A should be made of a short V-shaped section of 19 gauge wire attached at the center of the V to one end of the rod as in A, and bent transversely at right angles inward so they lie just above the molar cusps when the rod is inserted in the lingual half round tube in the mouth.

*Clinic before The American Society of Orthodontists, Atlantic City, April 30, 1921.

The tangs on the half round tube should be made of a V-shaped section of 19 gauge wire, the V portion being attached at right angles to the center of the flat part of the tube as in *B*, Fig. 2, and the ends bent upwards at right angles so that they will obtain a firmer hold in the interior of the plaster tooth in which they will be imbedded when the cast is poured.

The next procedure consists in placing a properly tanged portion, *A* Fig. 2, of the half round rod into each half round tube in the mouth where they would appear as in Fig. 3, the tangs being closely curved over the occlusal surfaces of the molar anchor teeth.

Fig. 3

Fig. 4.

A compound impression is next taken of the dental arch, the tangs remaining in the compound, the half round rod only emerging and locating the exact position for the tubes, as in Fig. 4.

Half round tubes with tangs attached are then placed on the half round rods in the impression which is then filled with investment material.

Upon removing the compound shell from the cast, the half round rods with tangs attached are removed from the tubes, and the cast appears as in Fig. 1, with the half round tubes exactly in position for the repair or reconstructive work.

Several dozen pairs of the tanged rods and tubes may be made up of manganese bronze, so that it will not be necessary to use gold and platinum rods and tubes for this repair work.

This method will also prove valuable in making a duplicate appliance for clinical demonstration, eliminating all of the band construction on the anchor teeth and the extra impressions and casts usually necessary when making appliances for clinics.

REPORT OF CASE BEFORE THE AMERICAN SOCIETY OF ORTHODONTISTS, ATLANTIC CITY, N. J., APRIL 27-30, 1921

BY DR. GRAFTON MUNROE, SPRINGFIELD, ILL.

THIS is an unusual case where a permanent first molar is erupting against or at the enamel ridge or neck of the deciduous molar, acting as if impacted and causing distressing pain.

At the appeal of the mother of the little patient, I removed the deciduous molar thereby giving the permanent molar complete freedom. After a few

Fig 1.

days, bands were made and adjusted to the deciduous first molar to which was attached spring wire resting against the mesial face of the permanent molars for the purpose of maintaining space for the second premolar, and also for the purpose of pushing the molar into better occlusion with its mandibular permanent antagonist.

DEPARTMENT OF ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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TECHNICAL PHASES IN THE SUCCESSFUL CONTROL OF THE EPIDERMIC INLAY*

BY JOSEPH D. EBY, D.D.S., NEW YORK, N. Y.

THE purpose in presenting this subject today is not to exploit an interesting bit of surgery, but rather more to stress certain technical details which, after seasonable experiences, have become firmly fixed in my convictions as essential in the successful use and broader scope of the epidermic inlay.

It is also my belief that, as yet, the remarkable possibilities of the epidermic inlay remain undeveloped and is something which merits the most careful consideration of oral surgeons at this time, particularly in connection with prosthodontics.

It seems to me now that the possibilities offered by the epidermic inlay in lining pockets for the secure retention of dentures and improvement of facial appearances are so great that it becomes the duty of oral surgeons to carry these facts to the prosthodontists to the end of increased efficiency in both instances and greater comforts to humankind.

The great value of the epidermic inlay has already become well established for use in the oral cavity in the release of adhesions, flap and other raw surface coverings and other similar purposes but for its assistance in providing more secure attachment, increased functional value and improvement of appearances in prosthetics, I do not believe that its value has been sufficiently impressed upon the prosthodontists and to this extent do I believe that oral surgery is liable to prosthodontia for neglect in dissemination of knowledge and usefulness of purpose.

Many interesting and valuable facts occur to me among the details of

*Read before the Section of Stomatology, American Medical Association, Boston, Mass., June 10th, 1921.

A treatise based on the Experiences of 1919-1920, in Association with Lt. Cols. Rob't. H. Ivy and Jay D. Whitham, M.C., U.S.A., in the Surgery, and Capt. Roy L. Bodine, D.C., U.S.A., in the Mechanical and Prosthetics.

this subject, and many invaluable experiences which establish the premise of my claims will have to be withheld, owing to the short time allowed for presentation of subjects before this Association, therefore let us forego all of the surgical principles and confine our thoughts to debate on the pre-operative and postoperative *mechanical principles*, essential in the far-reaching and best results of this operation.

The history of the use of a thin shaving of epidermis, or Thiersch, as a free graft for the purpose of lining cavities is rather vague and literature dealing with the subject has not been found by myself prior to the reports of Dr. J. F. Esser, M.D. of Holland, who used it while engaged in plastic surgery in the early part of the recent Wars, (about 1915) at Reservespital No. 8, Vienna, Austria.

Dr. Esser styled this operation the "epidermic inlay" and in his first writings on the subject he states as follows: "For a long time many surgeons

Fig. 1. Obliteration of lower labial sulcus, path of missile, lower lip adherent.

have endeavored to obtain a skin covering by laying on Thiersch skin pieces in hollows and on wounds. For hollows, these measures were mostly not sure of success and have not been generally applied, though a keen interest has been taken through many good results. I thought the uncertain results could be avoided by improving the irregular growing together of the skin and the pieces laid on, therefore, I looked for a means of applying the Thiersch faultlessly even and under equal pressure."

Dr. Esser then describes his original method of conforming dental modelling composition into the area, over which the Thiersch graft, (taken preferably from the inner surface of the upper arm) was draped, then the "Stent" (named for a dental compound made by Stent, which he used for this work) was thus buried into the cavity with the deep surface of the graft in contact with the raw surfaces and closed by suturing the margins together.

At the time of his writing, he had employed the epidermic inlay successfully in seven types of operation, as follows:

- “1. Enlargement of conjunctival sac.
2. Construction of part or entire ear.
3. Enlargement of mucous membrane of mouth.
4. Enlargement of the hollow of the mouth.
5. Plastic of hard and soft palate.
6. Preparation for different skin plastics.
 - (a) Inner coverings of flaps.
 - (b) Former coverings of the secondary defect.
 - (c) Both purposes at once.
7. Plastic of the urethra.”

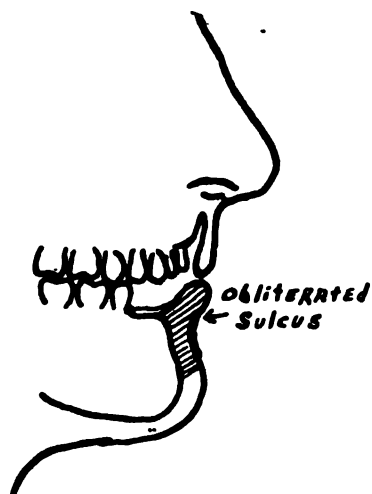


Fig. 2.—Diagrammatic cross-section, showing adherent tissues.

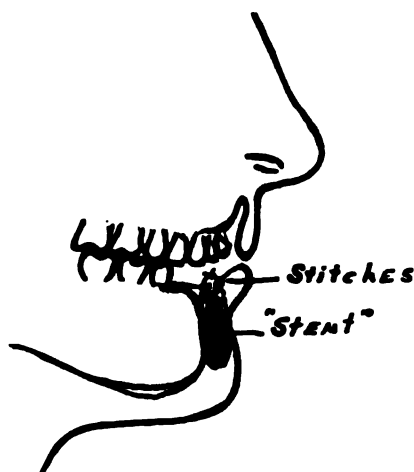


Fig. 3.—Diagrammatic cross-section, epidermic graft planted on a buried "Stent," closed by suture.

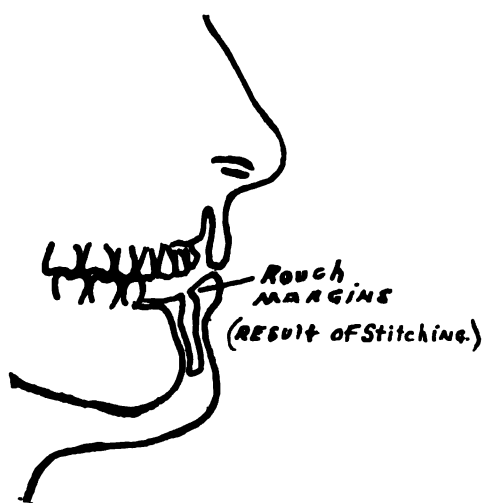


Fig. 4.—Diagrammatic cross-section, demonstrating objectionable rough margins at orifice of incised region, after removal of a sutured-in "Stent."

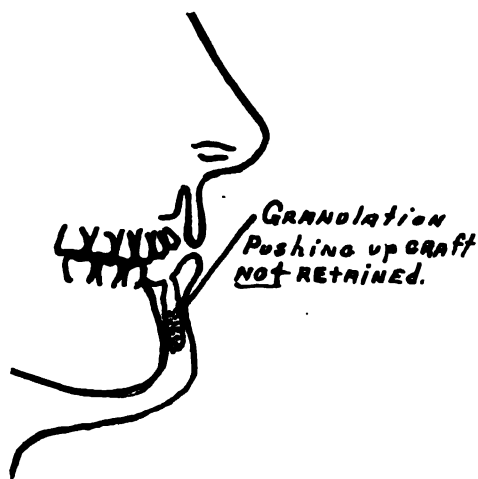


Fig. 5.—Diagrammatic cross-section illustrating the rapid granulation of the tissues beneath the graft which does not affect the nourishment but pushes it out of the desired position, if not retained.

In groups 3, 4 and 5, in which we are interested, he states that after a fortnight the area would be opened, preferably with scissors which would "follow the thinnest line of the healed margins."

As to the problem in which we are most concerned in this paper, i.e., the retention of the depth of the newly healed and unseasoned sulcus until the prosthesis was inserted, he does not state his experiences but it may be clearly grasped by the reading of his entire article that he recognized great future usefulness and improvements of the principle, *at that time undeveloped*.

Major H. D. Gillies, of England, states: "The principle of the Esser epithelial inlay marks an epoch in surgery, and the opportunities for its application are far from exhausted."

Major Gillies does not allude to reasons for the disuse of the buried "Stent," but he shows several forms of apparatus used for sustaining the graft and his illustrations of the healed graft *in situ* showing the smooth surfaces,

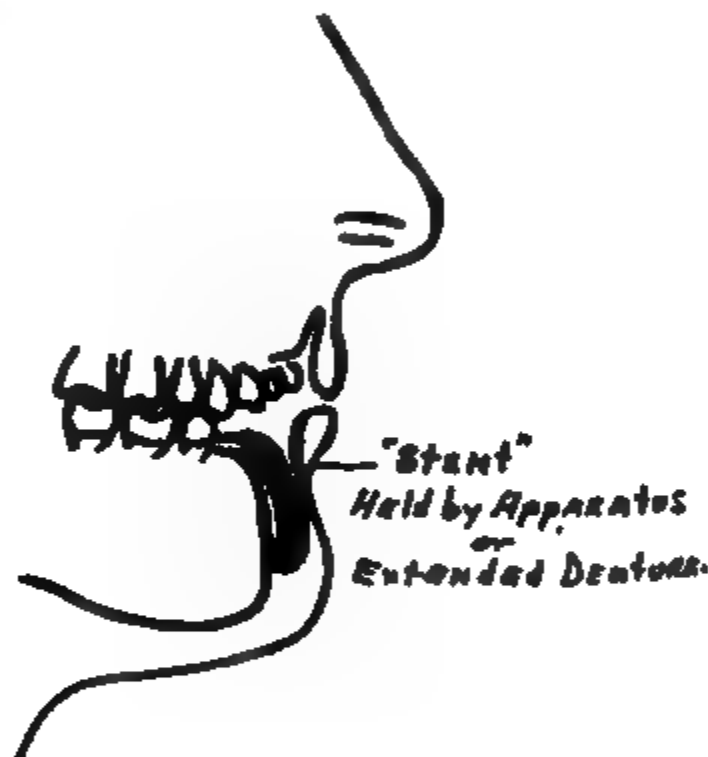


Fig. 6.—Left lower buccal vital epidermis which was pushed up to the original surface of the adhesion because of lack of retention after the removal of the "Stent."

Fig. 7.—Diagrammatic cross-section illustrating "Stent" immobilized on apparatus or denture-extension and to be worn as a retainer until permanent denture is inserted.

contiguous with the mucous membrane margins, lend evidence to the fact that he and his associates recognized the difficulties caused by the ridged margins produced by the sutured in "Stent" and the dangers of lack of retention before the insertion of a prosthesis.

The French and the Canadians were also quick to apply various forms of splints and mechanical apparatus for the support and retention of epidermic inlays, but in the main, the anchorage of their devices consisted of cemented-on attachments and it occurred to me that the many objectionable features of such apparatus could be eliminated by the use of securely clasped-on devices when teeth were remaining in the arches, the construction of which, as well as their manipulation, during the operation and while constructing prosthesis were always found to be very efficacious and a source of much comfort to all concerned, thus abridging the connecting links of an otherwise clumsy or dangerous technic.

In Fig. 1 attention is called to this case wherein the lower labial sulcus was obliterated and the function of the lip was impaired by the path of a missile; this case being shown to illustrate typically the basic principles which we desire to discuss.

Fig. 2 illustrates diagrammatically a cross section through this region, showing the tissues adherent to the outer surface of the symphysis and the alveolar border.

Fig. 3 shows the incision of this region, close to the bone in which the epidermic graft has been planted on a buried "Stent," and closed by sutures.

Fig. 4 illustrates the general appearance of the tissues upon the removal of the "Stent" and which the oral surgeon should realize, are exceedingly objectionable, both for the proper insertion of a denture and the cosmetic appearance of the lip, there being produced a rough margin along the alveolar border, which is very bad for the prosthodontist and which is obliged to



Fig. 8.

Fig. 9.

Figs. 8 and 9.—Graft on "Stent," on apparatus, out of and in position. The speed and accuracy with which the smooth surface and uniform pressure as sighted by Esser, is controlled by this plan, prevents the ingress of saliva and other dangers attending the time of suturing.

undergo a transitory change, also a rough margin is formed on the inner border of the lip or cheek which tends to redundancy and may be conspicuous, in fact, these margins, wherever they occur in the mouth, are troublesome.

The next problem to be considered in this method is one which proves to be an almost sure cause of failure because of the fact that during the interval between the removal of the "Stent" and the insertion of the denture, the sulcus closes by granulation beneath the graft, sometimes with astonishing rapidity.

Fig. 5 illustrates Nature's plan of healing activities beneath the adherent graft which, unless retained in its original position, will be forced out of place; it is just at this stage that this operation becomes adverse to the laws of healing and must be retarded by mechanical resistance which the sutured-in "Stent" does not supply.

Fig. 6 shows a result wherein the unretained graft was forced upward to

the original surface and although vital and successful in every other particular, rested in a shriveled mass from lack of retention and was a failure.

Fig. 7 shows the appearance of a "Stent" held securely into position mechanically, wherein the margins of the incision are free and smooth.

Figs. 8 and 9 show graft on "Stent" attached to Jackson apparatus, out of, and in position, illustrating the speed, accuracy, control and security of this plan wherein the operator is thus relieved of the liability of the en-

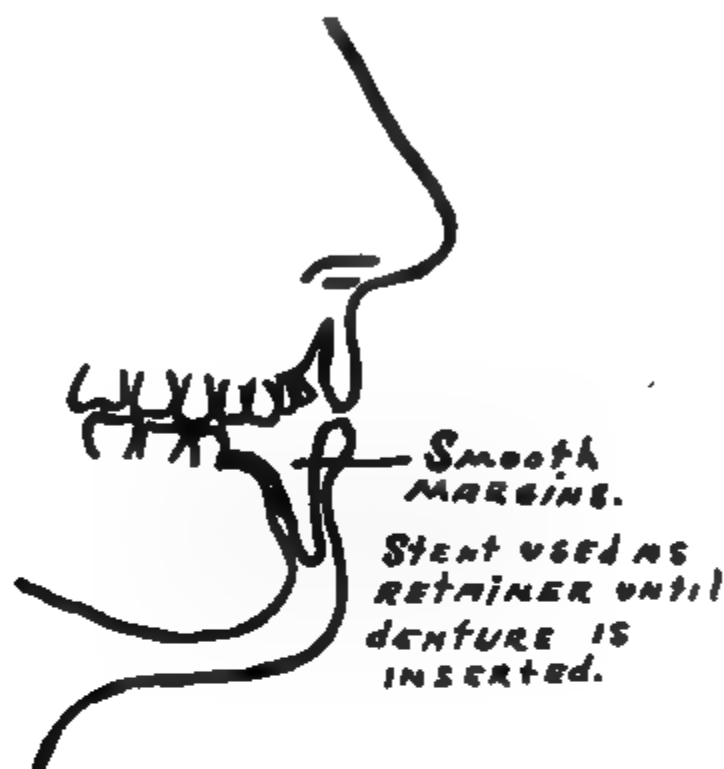


Fig. 10.—Diagrammatic cross-section, illustrating smooth alveolar and labial margins at orifice of graft, very much to be preferred for the prosthesis and for the cosmetic effect of lip.

Fig. 11

Fig. 12.

Figs. 11 and 12.—Typal forms of apparatus, upper and lower, where teeth are present.

croachment of saliva during the process of suturing and it is believed that the rigidity of this support is greater and better for the mouth than a "Stent" which, although sutured, is not free from movement by the muscles.

Fig. 10 a diagram to illustrate the smooth surfaces of the graft, contiguous with the margins of mucous membrane.

Figs. 11 and 12 designs of Jackson regulating apparatus with secure

spring-clasp attachments and loops for the attachment of the "Stent," all of which can be worked with freely during operation, and worn as a retainer.

Figs. 13 and 14 photographs of the apparatus used for the graft and as a retainer until the denture was ready to insert.

Fig. 15 obliteration of upper labial sulcus, lip adherent to alveolar border.

Fig. 16 shows photograph of denture made to fit the defect with holes drilled in superior border for the attachment of modeling composition.

Figs. 17 and 18 after incision of the sulcus, modeling composition added to the denture over which the epidermic graft was placed, this is perhaps one

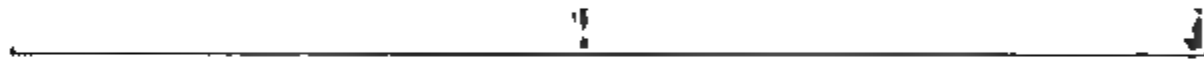


Fig. 13.

Fig. 14.

Figs. 13 and 14.—Apparatus used to support graft and as retainer. also the denture.



Fig. 16.—Illustrating the principle of perforating the border of a denture, previously made to fit the defect and to provide for an extension of modeling composition during the operation.

Fig. 15.—Obliterated upper labial sulcus, lip adherent to alveolar border.

of the best methods when possible to employ it, because it is a comparatively simple matter to reproduce the modeling composition with vulcanite later.

The next question to be answered is what shall be done for the mechanical support in edentulous arches.

Fig. 19 illustrates a very simple apparatus for the maxillæ, consisting of a swedged metal plate fitting the forehead with loops of wire soldered to the borders, to be engaged to a plaster bandage head-cap, the square tubes

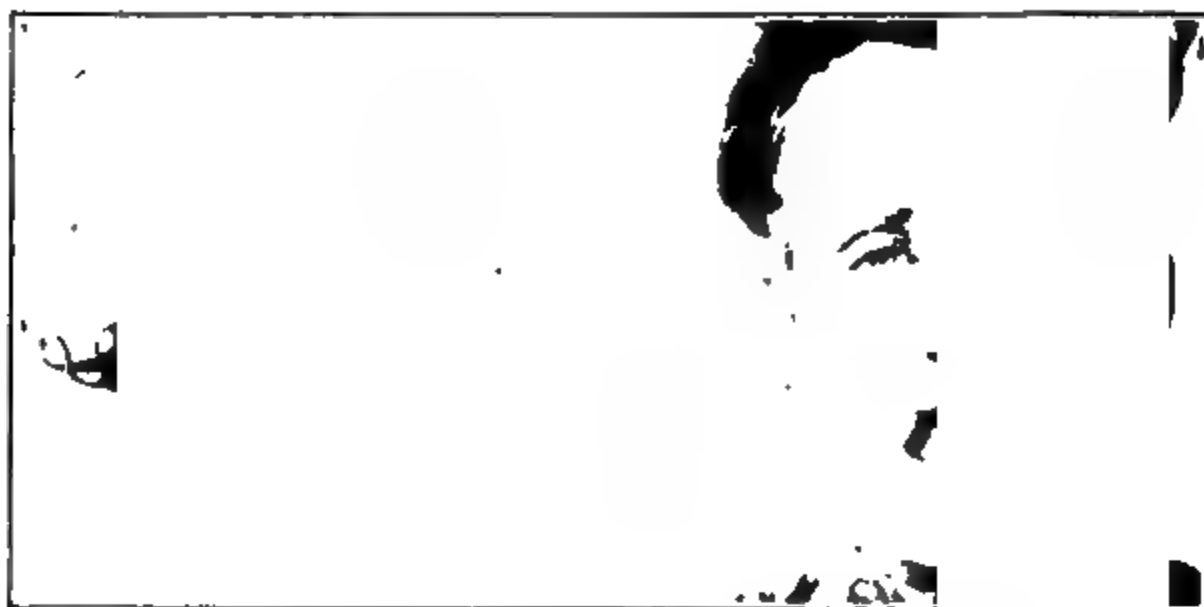


Fig. 17.

Fig. 18.

Figs. 17 and 18.—Denture with modeling composition added and after it is inserted bearing the epidermic graft. The lips are being voluntarily retracted by the patient.

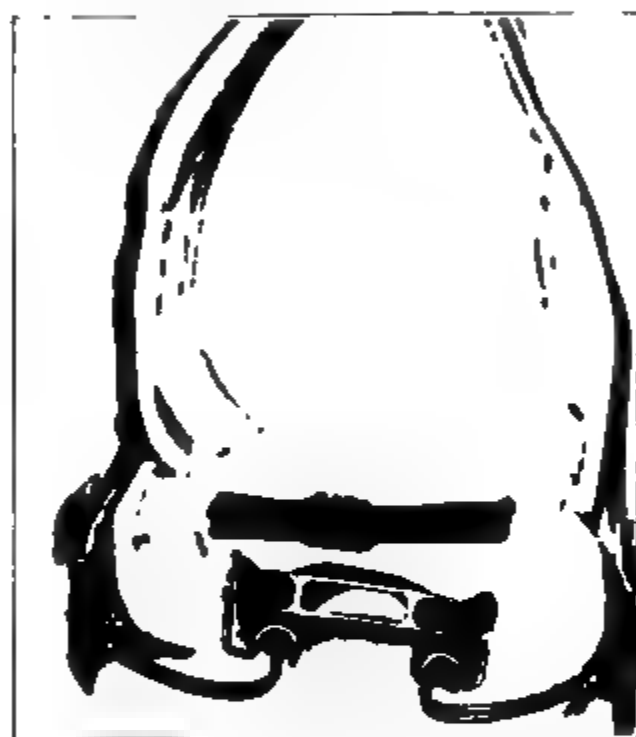


Fig. 19.—Apparatus for sustaining "Stent" and retaining graft, edentulous upper. Plaster bandage cranial cap, swedged frontal plate with attachments for adjustable intra-oral stage, made for attachment of modeling composition during operation.

Fig. 20. Apparatus for sustaining "Stent" and retaining graft, edentulous upper. Kingsley principle anchorage with removable "grid" made to fit in parallel, horizontal, anterior-posterior tubes for attachment of modeling composition during operation.

Fig. 21

Fig. 22

Figs. 21 and 22.—Adherent labial and buccal tissues and appearance after operation with epidermic inlay supported by plumper of modeling composition on "grid."
This apparatus was also worn as a retainer until the denture was completed and ready for insertion.

soldered to the frontal plate contain set-screws for an adjustable intraoral stage, to which the modeling composition is added during the operation.

Fig. 20 shows another form of apparatus employing the Kingsley principle of anchorage, with an anterior "grid" made of 12-gage wire which is adjustable to the plate by means of parallel, horizontal tubes, to which the modeling composition is to be added during the operation.

Figs. 21 and 22 illustrate contracted lip-graft and adherent buccal tissues, before and after insertion of epidermic graft, supported by the apparatus.

The case shown in Figs. 23, 24 and 25 required the construction of a very tedious, two-section denture which is here shown, dis-assembled, assembled, and in position. The apparatus was enabled to be worn during this period,

Fig. 23.

Fig. 24.

Fig. 25.

Figs. 23, 24 and 25 —Two section prosthesis, disassembled, assembled and in position.

Fig. 26.

Fig. 27.

Figs. 26 and 27.—Complete obliteration of mandibular buccal and labial sulci, apparatus and modeling composition.

The intra-oral portion consists of a No. 12 gauge wire loop, specially fitted as to size and adjustable to outer chin-clamp.

preventing the loss of the surfaces which were made into models for its construction, otherwise the result of the graft would have been lost.

Figs. 26 and 27 show an edentulous mandible with obliterated sulci, such that a denture was physically impossible. In the first epidermic graft a simple buried "Stent" was used, but before the denture was completed it no longer fitted the unretained surfaces. A chin-clamp was taken from a saliva controller, to which a specially fitted wire loop was adjusted for the intraoral attachment of the "Stent," with the particular intention of its being worn to retain the space until the denture was completed.

Figs. 28, 29 and 30 the apparatus in position, also how it appeared while it was being worn until the tedious denture was made.

It was a great pleasure to personally see this patient masticate with comfort on this denture and to many of those of you present here today who did his bone-grafting and soft tissue plastics, and remember him as he was, this must be very pleasing.

It is not claimed that it is impossible to acquire success by the simple implantation of the "Stent" but it is believed that results are so much more greatly assured by mechanical support, that Nature's adverse tendencies to this operation are so much better controlled, and that the general facility of this plan more nearly fulfills the requirements which this work should include.

The motion picture to be shown now is self-explained and is intended to show certain details in the technic of this operation.

Fig. 28.

Fig. 29.

Fig. 30.

Figs. 28, 29 and 30.—Apparatus in position after operation. Apparatus as it was worn during construction of denture and the denture. Secure and functionable denture in position.

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DISCUSSION

Dr. Ferris Smith, Grand Rapids, Michigan.—Dr. Eby has so clearly and consistently presented this subject that there is little one can discuss without duplicating what he has said. The retaining apparatus which he has demonstrated to us was a new idea to me and appears to be quite superior to the one we are using at Queen's Hospital. It was much easier of application and much easier to remove and clean after the fifth or sixth day. Dr. Eby has emphasized, but it would not seem to me sufficient, the necessity of keeping this modeling compound in the cavity until all granulations have occurred. He has indicated that procedure two or three times, but it seems to me that he should lay more emphasis on it. I have seen a beautiful inlay spoiled on the twentieth day by contact, due to the failure to keep the apparatus in until contraction was complete. These suggestions occur to me. It is an almost absolute certainty that this graft will grow in the presence of the mouth secretions. I have seen those grafts grow in the presence of pus in the mouth. One would not expect a graft to grow in the presence of pus.

There is just one other point I want to bring out. It is just a difference of technic in one case. That was the last case he showed. That was the case in which there has

been extensive bone loss and soft part loss, the soft parts being restored first and the subsequent bone graft inserted and a sulcus established and making possible the insertion of the denture. Gillies attacked this problem in a little different way in the matter of using an inlay and what he called an outlay. He divided the two layers of skin. The incision was made under the skin and the outer layer of skin dissected from the bone, then the modeling compound introduced from below and the wound closed from below. The purpose was to prevent possible infection of the bone graft. The modeling compound was left from six to eight days, at the end of which time the lip was incised from above and the modeling compound taken out from the inside and the same principle was followed as here, making sure that no secretions would get on the graft during the process of healing.

One point in conclusion: The apparent metamorphosis of the skin after long residence of a graft. The skin takes on a pinkish white color like mucous membrane. Epithelization apparently ceases and for all intents and purposes it is a mucous membrane.

Dr. V. H. Kazanjian, Boston, Mass.—Dr. Eby, in a concise and well-illustrated paper, has called to our attention the usefulness of the Esser method of skin grafting in war injuries of the face and mouth and also has given us many valuable suggestions for the possible use of this method in civilian practice, especially in certain abnormal conditions of the mouth where fitting artificial dentures is difficult.

Unquestionably our operative measures for the restoration of the face would have been greatly handicapped if the Esser method had not been devised. To illustrate this point allow me to cite you a case of a patient who lost the entire body of the mandible, leaving a lacerated, but otherwise intact but unsupported, facial tissue. In order to hold these tissues in their normal contour and avoid serious deformity, it was necessary to make an artificial substitute for the lost bony tissue on the same principle as artificial plates are made. The retention of such a plate is a problem, as can be readily seen, since anatomic landmarks of the mouth are destroyed by the loss of the bone and the presence of scar tissue. This difficulty was overcome by adding flanges to the anterior and buccal aspects of the plate. These projections rested in pockets lined with epithelium in the buccal cavity. Thus the soft tissues and the plate gave mutual support to each other.

Undoubtedly there will be many conditions in civilian practice where this method will save us from serious difficulties as Dr. Eby has mentioned in his paper, yet, it must be experience that will show the extent of its usefulness in prosthetic restorations of the mouth.

In order to adapt this method to civilian practice, great care and judgment must be exercised in the selection of cases for the following reasons: (1) Because there is always danger of any new device or operation being overworked. (2) It may give incompetent prosthetic dentists a ready excuse for their failures in fitting plates.

Dr. V. P. Blair, St. Louis.—I know that avascular grafts were used long before the war for making the lining of the eye, the conjunctiva, which would correspond to the Walden plan outlined by Dr. Eby and to the plan of Gillies. Dr. Bond of this city told me that some years ago Dr. Abby of Washington made or attempted to make an artificial vagina from mucous membrane. Dr. Bannister, of Kansas City, made a conjunctiva from a full thickness of mucous membrane and I believe full thickness mucous membrane will prove more satisfactory than the Thiersch graft.

The incisions shown for harelip are about one hundred years old and are about as new as most things we have on this earth.

Dr. Joseph D. Eby, New York (closing).—I am sorry that this subject is so entirely out of place in an otherwise beautiful surgical and pathological program and had I the censoring of this program, it would have been withheld.

Knowing that there are differences of opinion regarding the operative technic, my hope, in presenting the mechanical phases of this subject here today, was to stress certain points upon which the best successes have been entirely dependent in my hands and which are regarded as unimportant by many, which is nothing more than a very wilful attitude of personal indulgence against the best possibilities of a very valuable operation, in my estimation.

Dr. Smith's manner of discussion based on his exceptional experiences and knowledge of the epidermic graft have been most interesting to me and with the remarks of Dr. Kazanjian coming from an old master, I have nothing to say in comment excepting to urge that their concepts should be carefully heeded.

From Dr. Blair's references as to the first time of use and origin of the epidermic graft, it may appear to some that Dr. Esser is given this original credit. This is not intended, and upon noting certain quotations from Dr. Esser himself, it will be found where he states:

"For a long time, many surgeons have endeavored to obtain a skin covering by laying on Thiersch skin pieces, etc."

It is the plan of mechanical support to which I was thus extending historical credit to Dr. Esser.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Under the Editorial Supervision of

JAMES DAVID MCCOY, D.D.S., Los Angeles—ROBERT H. IVY, M.D., D.D.S., Washington
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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

THE NEGLECTED PHASES OF DENTAL ROENTGENOLOGY

BY WILLIAM A. LURIE, M.D., NEW ORLEANS, LA.

ROME was not built in a day. Neither was any great or important undertaking completed without great effort and much time.

Dental roentgenology is an important undertaking in medical science. It is comparatively a recent acquisition. Many discoveries of note have been made possible because of it. Much criticism for unnecessary and untimely treatment and surgical operations has been hurled against it.

Today, though roentgenography is undertaken and practiced by ever-increasing numbers, there is a corresponding increase in number who are frank enough to confess their limited understanding of the subject. The reason for this discrepancy must be sought out and if possible rectified, before so valuable an asset in medical and dental diagnosis is discarded because of a lack of unanimity.

Analyzing the situation there is one thing which becomes immediately apparent and that is the difficulty of the present terminology in reference to the subject. Our language is confounded much as it was at the building of the Tower of Babylon. If a terminology which is not comprehensive and elastic enough to encompass the subject is not determined on, or adopted, many days will pass before a truly concerted effort in roentgenology can be looked for.

A terminology such as should be used in connection with the subject of "x-ray" should be one which in no way can be confused with any other subject. It should be distinctive, descriptive and comprehensive. It should permit of a proper coinage of additional terms, that by their use, words of individual purpose will be developed and not words of indistinct meaning or words easily confused.

Up to the present many names have been adopted. They have ranged from the use of the name of the discoverer, William Conrad Roentgen, to a

prefix suggesting an electric or potential force. The former of the names is perhaps the least confusing, but not descriptive. The latter, while in a measure descriptive of the force applied, is confusing in its similarity to other electrical force and phenomenon.

The author has often suggested a term which not alone is distinctive, but also distinctly aids in the determination of the local condition which produces the picture.

In x-ray photography, the picture is produced by virtue of a definite power in the rays which emanate from an active x-ray tube. That power differs from the power of ordinary rays of light from any form of luminous point, in that the rays, after passing through otherwise opaque bodies, retain the power of reducing the salts of silver on the sensitive film. This reduction takes place in proportion to the residual force retained by such rays as have passed through the intervening or pictured body. The power which x-rays possess, which ordinary rays of light do not, is the power of penetration.

By virtue of the power of penetration, the rays which are generated in an x-ray tube pass through masses,—in this instance those masses are tooth structure and jaw bone as well as their surrounding masses of soft tissue.

Experimentally it has been proved that x-rays penetrate an evenly dense body in direct ratio to the mass of distance through such a body, through which the rays must travel. An early and efficient guide to the power of a set of rays was constructed of metal. Its virtue lay in the degree of density produced on the exposed plate, by a given exposure of certain intensity to determine the correct time to allow a tube to be active. This device is called a Penetrometer.

It has long been recognized that penetration is the particular virtue of the x-ray. Too bad that in the later years, when looking for a name to apply to this branch of science, that the word penetration was not more strongly urged. By using a corrupted prefix derived from the word penetrate or penetration, as "peneto," all the words necessary and descriptive of this particular branch of the arts can be formulated and more easily understood.

A partial list of the more common terms substituted for those in use today is appended.

Penetrometer, a means of measuring penetrating power; in this instance of x-rays.

Peneto ray, a phenomenon in physics the application of which was discovered by William Conrad Roentgen. The most pronounced and useful quality of these rays being their power of penetration.

Penetology, the study and use of the roentgen ray as applied to medicine and surgery.

Penetologist, one skilled in Roentgenology, in its application and interpretation.

Penetogram, the shadow picture produced upon a photographic film by the penetration of an otherwise opaque mass by roentgen rays. A registration of the penetration of light rays.

Penetography, meaning the making of shadow pictures by roentgen ray penetration. The art of making roentgenograms.

Penetotherapy, treatments by the application and penetration of the roentgen ray.

Penetodermatitis, skin reaction due to too strong or too often repeated application of the roentgen ray. A pathologic condition of the skin.

Penetographic examination, the examination and study of the shadow pictures produced by the Roentgen ray upon the photographic film or fluoroscopic screen. The translation of light and shadows into the arrangement of parts as known to exist. In this instance the explanation refers to anatomic arrangement of parts.

Peneto diagnosis, diagnosis by aid of the Roentgen ray. The association of the finding of anatomic changes made visible by the penetoray with symptoms of disease.

Pathopenetography, the study of pathologic lesions as revealed by the roentgenogram; it implies, and renders imperative, a knowledge of the pathology and of the interpretation of normal and abnormal tissue and its position as recorded in the roentgenogram.

Penetoize, to apply the roentgen ray.

Penetoization, the application of the roentgen ray.

Penetoism, the untoward effect of the roentgen ray.

Peneto-interpretation, the interpretative branch of roentgenography. The making of diagnosis from roentgenograms.

The use of the terms as above described, and the explanation of the variations on the pictured film as a variation in penetration and in penetrability will permit of an easy disassociation of pathology from the actual existant condition, so that an area described may be said to be of lessened or increased penetrability over the normal for the area, rather than to be considered degenerated or even abscessed.

There is, of course, the necessity of understanding just what process takes place in the bone area, covered by the soft tissue and out of sight, before one can undertake a diagnosis. The author has carefully studied the subject of roentgenography, particularly the portrayal of the dental areas, with an idea of developing better and more simple diagnosis of the conditions and a better understanding of the associated pathology, and in his opinion, considering the x-ray picture as the registration of the penetration of light through an area of various densities, simplifies the subject and makes possible a more accurate and understandable terminology. It is to be hoped in the future, for the purpose of standardization, the terms in roentgenology will be simplified and coordinated.

Why not "Penetology?"

DENTAL X-RAY FILM HOLDER*

BY H. E. HARVEY, LIEUTENANT COMMANDER, DENTAL CORPS, UNITED STATES NAVY

A VERY ingenious and practical film holder has been developed and patented by Lieutenant H. G. Ralph, of the Dental Corps. It consists of two parts, the holder of which goes in the mouth of the patient, and a removable guide or pointer which can be detached after the holder is in position. A portion of the holder projects as a flat metal lug at right angles to the plane of the

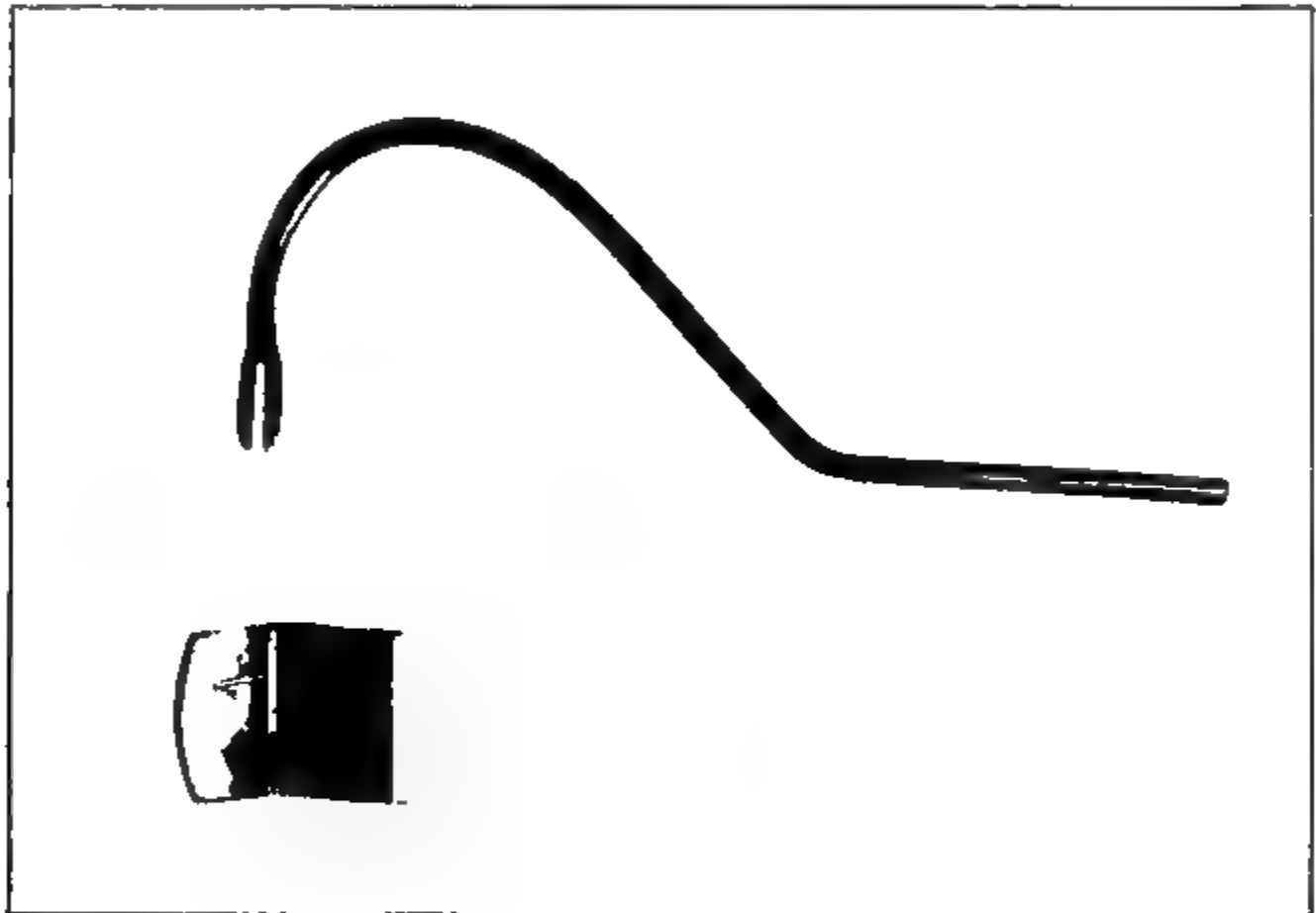


Fig. 1.—Holder and Pointer.

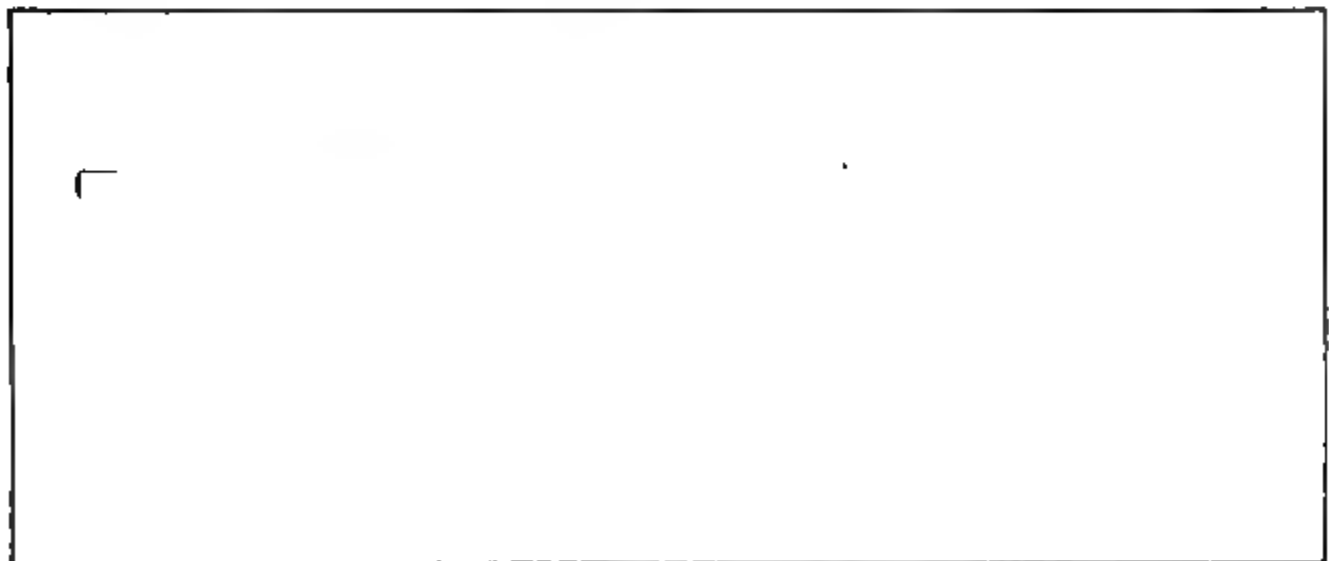


Fig. 2.—Film in holder, pointer attached.

*Reprinted by permission from United States Naval Bulletin, October, 1921.

film, and this lug is held firmly between the closed teeth of the patient while the x-ray is being taken.

The construction and use of this type of holder presents the following advantages:

First. The film is held behind the selected teeth without the possibility of slipping.

Second. The area necessary to obtain a definition of the apices is covered.

Third. The jaws being closed allow relaxation of the adjacent muscles, thus frequently obviating the tendency to gag, particularly when raying the lower posterior molars.

Fig. 3.—Holder and film in mouth, pointer attached.

Fig. 4.—Film and holder in mouth, pointer detached.

Fourth. A removable pointer indicates the plane and position of the film after it has been inserted in the mouth and the jaws closed, which is a material aid in getting the correct angle for the tube.

Fifth. The holder and pointer are entirely of metal, and can be sterilized by boiling.

Sixth. The appliance is of sufficient durability to be practically indestructible.

In lieu of a more detailed description illustrations are given.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Histology and Pathogenesis of Pyorrhea Alveolaris. Fleischmann and Gottlieb (Vienna). Dental Cosmos, April, 1921, lxiii, 4.

The authors conclude their serial article with the following summary: they agree with others that atrophy of the bone is the essential causal requirement, and have seen cases in which atrophy was the only pathologic condition present. At the same time it must be admitted that the bone may be involved secondarily to inflammation of the soft parts. The bone atrophy can proceed only from a constitutional factor. The mechanism by which this atrophy produces pyorrhea will be discussed in a separate paper, as far as the clinical requirements are concerned; in this connection only certain anatomical data may be mentioned. After the atrophy is initiated the epithelium of the gum begins to proliferate down along the cementum, beginning at the point of attachment to the latter, and in this way separation of the two tissues forms the pocket. Inflammation may now be set up by any one of a number of possible irritants, provided that the irritation is persistently applied. An ulcer eventually forms in the pocket from which the pus of the disease is secreted. The bone may be involved secondarily but this, as stated above, should not cause any confusion with the primary atrophy of the osseous tissue. The periodontium appears to be immune in this process, which explains why pyorrhea is painless. The primary atrophy of the bone may or may not be accompanied by retraction of the gums.

"Atresia of the Palate." T. W. Brophy (Chicago). The Journal of the National Dental Association, May, 1921, viii, 5.

The author has seen five cases of this very rare condition in the past four years. Study of the literature of the subject shows that this is meagre. The author uses the term as a synonym of adhesions between the palate and pharyngeal wall. For some reason surgeons seem unwilling to operate on these cases. A diagrammatic view of a case of the author's shows in sagittal section that the posterior wall of the soft palate adheres to the posterior wall of the pharynx in such manner as to shut off the nasopharynx from the oropharynx. Hence the condition should preferably be called atresia of the

pharynx from palatal adhesions, and not atresia of the palate. Only a canal or passageway can be thought of as atretic; hence we speak familiarly of atresia of the anus, vagina, etc. In one of the author's cases the patient, a boy of 9 years, had developed atresia of the pharynx as the result of an operation for the removal of the tonsils and adenoids. The atresia was total as shown by the accumulation of the nasal secretions above the adhesion. These subjects obviously cannot blow the nose and to secure drainage it is necessary for them to lean forwards at intervals and to allow the accumulations to escape by gravity. A physician had made transverse opening in the adherent palate to give temporary relief. In operating, the surgeon's aim must be to prevent readhesion of the detached palate. A mouth speculum having been introduced a heavy silver probe was passed through a nasal fossa to serve as a director for detaching the palate from the pharynx with the knife. Catheters containing silk sutures are now passed through the nose and out of the mouth and a soft rubber pad with perforations for sutures at the corners is interposed between the palate and pharynx, tied in and left *in situ* for three weeks. The two upper sutures are tied together at the columna nasi, a stuffed rubber glove finger being interposed to prevent tension on the soft parts; we do not see any mention of the point of attachment of the lower sutures unless to the upper dental arch.

Dental Education of Medical Students. T. W. Brophy (Chicago). *Dental Cosmos*, April, 1921, lxiii, 4.

In the course of a general article on the trend of dentistry the author relates that in 1915 he made an inquiry into the number of medical schools which gave courses in oral surgery. Of sixty-four colleges which replied, but six gave such a course. In a small country like New Zealand, no medical student can graduate unless he has devoted one year to the study of the dental organs and the treatment of their diseases. There is nothing like this in the United States or throughout Europe. The author does not of course advocate teaching medical students the technic of dentistry, for that would be to add three more years to his course. He would teach knowledge of the pathological conditions of the teeth and how to recognize them. The entire course would be somewhat as follows: origin and development of the teeth, minute anatomy and physiology, the pathology as above stated, the influence of diseased teeth on the general health, such as their part in forming the initial lesions of trigeminal neuralgia. He would teach the diagnosis of pulpitis, pericementitis, periostitis, alveolitis, dental alveolar abscess with its sequelæ—maxillary osteitis, caries and necrosis of bone and empyema of the antrum—, injuries and diseases of the terminal branches of the fifth nerve, especially the third or inferior maxillary division, and rhinitis attended by suppuration. The student should also be able to recognize excementosis, pulp nodules, inflammation of the glands, synovitis, myelitis, tumors and cysts of dental origin, etc. Among the causes of facial neuralgia are the results of thermometric changes on the fillings of the teeth and the pressure of artificial dentures

on the terminal branches of the fifth nerve. The student should know that large amounts of pus which exude about the necks of the teeth depress the vitality.

Some of the Present Tendencies in Dentistry. C. N. Johnson (Chicago). *The Pacific Dental Gazette*, May, 1921, xxix, 5.

The author first mentions the increased interest by dentists in society work. Attendance is large and interest keen. The latter appears to be due to extreme attitudes and practices which will need curbing. Partial replacement is a subject of universal interest today, but there are marked differences as to how this is best effected. Some of the ablest men are committed to certain methods, to the exclusion of all others, so that narrowness is introduced. Some would do away radically with fixed bridge-work, but such an attitude seems extravagant. We should by all means conserve whatever is good in it. There are remarkable instances in which a piece of fixed bridge-work has done good service throughout a long lifetime. Narrow viewpoints give an unconscious incentive to exploit the public; for example, to have them submit wholesale to the latest innovation of practice in the guise of a great advance in technics. The unscrupulous dentists naturally see here their opportunity to make money. The public are placed in a state of mind and their fears worked on. Wholesale extractions for focal infection with indications based on x-ray diagnosis represent another extreme viewpoint. A third is the routine application of minor surgical procedures in connection with extractions—"surgical exodontia"—and the opening up of old edentulous gums and jaws, all in the interest of the prevention or cure of sepsis. The sane dentist of the future will use each resource when it is strictly indicated and not as a matter of routine to be succeeded perhaps in a few years by some other extreme practice.

The Influence of Bucco-dental Sepsis and Periapical Foci on the General Health. J. Lagrange, *La Revue de Stomatologie*, 1920, xxii, No. 6, p. 335.

Bucco-dental sepsis constitutes an active tangible source of infection of the general organism, but on account of its obviousness is not nearly so dangerous a condition as the almost invariably undiscovered periapical infections which may, during many years, furnish a constant supply of injurious microbes to the bloodstream. In the hidden foci of devitalized and infected teeth, the blood finds a steadily renewed supply of microbes and toxins, for several millions of bacteria may originate daily at the level of the apex of a tooth, and the same individual often presents a considerable number of such lesions. The duration of the latent period is extremely variable and almost indefinite in some of the cases. In others, a rapid course leads to neighborhood complications, the least of which is represented by the formation of a fistula. Injections of cultures obtained from microorganisms derived from these foci showed that the same local and general disturbances developed in guinea pigs and rabbits as in the bearers of these infectious foci in the mouth cavity. Many therapeutic lesions are contained in these observations. The attention of the modern physician is especially invited to this subject

because the fact has been established that two infections of different origin do not become superadded in the same organism; either they destroy each other, or what is far more common, they multiply in often alarming proportions. Although some of these infections are intractable and practically incurable, it is a grave error to tolerate those which can be relatively easily eliminated. No serious general treatment can be instituted in a patient without careful investigation of the various infectious foci which he may harbor, including a thorough examination of his dental apparatus, all crowns, bridge-work, etc. The devitalization of healthy teeth should be regarded as a serious undertaking and as a probable source of periapical infection, with its dangerous sequelae for the entire organism, notably the joints.

Anesthesia in Dental Surgery. M. Ecker (New York). *Medical Record*, May 21, 1921, xcix, 21

The author has used a fifty per cent mixture of paraldehyde and anesthol over which the gases, nitrous oxide and oxygen were passed, in over 12000 cases. Naturally this association was found by him to be superior to any other tried. An average of one minute and fifteen seconds duration of analgesia is allowed for tooth extraction, while after removing the mask, even although the eye reflexes have returned, the analgesia is prolonged sufficiently for curettage of the sockets. The relaxation is more complete than under the simple nitrous oxide-oxygen mixture, and the holding straps formerly required for athletes and alcoholics are now dispensed with entirely. There has been no complaint of erotic or other dreams and no evidence of the hallucinations sometimes noted under the former plan of anesthetization. The author even uses his new method in place of local anesthesia for drilling out roots. There is less tension on the dentist at the end of the day's work as a result of the superiority of the new method. The amount of anesthol used averages 10 minims to the extraction. The composition of this anesthetic is ethyl chloride 17 per cent, chloroform 35 per cent, and ether 47 per cent. The original method of Dr. Gwathmey was to pass nitrous oxide and oxygen over this mixture, but the author modified it by adding to the latter an equal part of paraldehyde, securing slightly greater efficiency.

A New Pharyngeal Tube for Anaesthesia in Oral and Head Surgery. R. C. Coburn, New York. *The Medical Record*, July 23, 1921, c, 4.

Prevailing methods for the extraction of infected teeth are not entirely satisfactory. The method in most general use is ether by insufflation, with the tubes passed through the nares. The passage of the tube into the pharynx requires anesthesia much deeper than that needed for the extraction. Gas-oxygen given with the nasal inhaler is impracticable when the anterior maxillary teeth have to be removed and even in the case of the posterior maxillary teeth. On account of hemorrhage, it is the custom to tampon the upper pharynx. All of the obstacles may be done away with through the use of the author's flexible and collapsible pharyngeal tube, which is large enough to maintain respiration and permit the administration of gas and oxygen with the upper

pharynx packed. This tube is of spiral wire covered with thin rubber tubing. The distal end is attached to a rubber bag by means of an exhaling valve or nipple. The patient is anesthetized with gas and oxygen, using the face inhaler. The latter having been removed, the mouth gag is applied, the pharyngeal tube inserted over the base of the tongue, the pharynx well packed with gauze, and the gas-oxygen inhalation is then resumed through the tube. The latter must be fastened with a couple of strips of adhesive plaster to the patient's face (or be held in place by an assistant). The author has used this method in anesthetics of from a few moments' duration to those requiring two and a half hours.

Studies in Root Canal Sterilization. J. A. Marshall, San Francisco. *The Journal of the National Dental Association*, July, 1921, viii, 7.

The author concludes his serial article as follows: The paper correlates the laboratory study of root canal sterilization with clinical practice. The degree of penetration of antiseptics into dentin is illustrated by employing solutions of crystal violet and brilliant green. In many cases the dye penetrated through all of the dentin substance to the dento-cemental junction, but in no case was it possible to demonstrate the penetration into the cementum. In comparing the action of these dyes with that of the Howe solution (silver nitrate treatment) it is shown that the degree of penetration is apparently equal. The discoloration of the tooth structure may be controlled by varnishing and waxing the coronal portion of the tooth. The possibility of osmosis occurring between the tooth substance and the surrounding tissues is discussed. Since there is no demonstrable connection between the dentin and the cementum, except through the apical foramen, antiseptics properly applied to the walls of the root canal remain in the tissue. Finally a technic is described for obtaining permanent sterilization of the dentin.

Diet in Relation to Oral Hygiene. W. Seccombe, Toronto. *The Journal of the National Dental Association*, June, 1921.

The author arrives at a large number of generalizations on this subject. Some who are immune to caries never brush their teeth, while others who use the brush faithfully suffer from caries, because they possess some not understood susceptibility to it. But correct habits may confer immunity on some individuals. Oral bacteria *per se* are not the determining factor in dental disease because these are present alike in immunes and susceptibles. There can be no caries unless carbohydrate food is present, while salivary stasis is also invariably present—these two factors make possible the fermentation which is the forerunner of caries. Indigestion may give rise to increase of mucus and this with anatomical faults makes possible accumulation of debris. Indulgence in an excess of fermentable foods which form acids as end-products makes for caries, especially sugar and bread or flour foods; but overingestion of any kind of food is favorable for caries. The latter may occur with or without the formation of salivary calculus. In excess of

sugar caries develops without this formation. Another factor in the production of mouth disease is gingivitis, which may arise from overconsumption of food, autointoxication, or traumatism.

The Patient's Side of Pyorrhea. L. C. Snowden, Dallas. The Texas Dental Journal, August, 1921, xxxix, 8.

If the dentist cannot treat pyorrhea himself he should send the patient to a specialist in that affection. It often happens that the ordinary dentist contents himself with cleaning the affected teeth. The duty of the specialist is to determine which teeth are to come out by means of ordinary and x-ray exploration. Teeth without due osseous support should come out at once without previous attempts at treatment. The patient can cooperate in the management of his case by cleansing his teeth, not with ordinary dentifrices but with powdered pumice stone and a hard bristle brush used according to a special technic which emulates that used by the dentist himself in his daily practice. The patient must rehearse the technic before the dentist. At present the national care of children's teeth leaves much to be desired and America is not so far ahead of Europe in this respect as we like to believe.

Ocular Hygiene with Special Reference to the Dental Profession. W. D. Rowland, Boston. The Dental Cosmos, June, 1921.

The author deals especially with the subject of illumination. He sums up by stating that lights should be placed that no undiffused rays can fall directly upon the eyes for any length of time. Northern exposure is preferable because this gives a maximum of diffusion with a minimum of glare. Localized direct lighting should be combined with a good general system, to avoid the necessity of work with a brightly illuminated area upon a dark background, which is the cause of great fatigue, because of the need of adaptation in shifting the vision. Light should come from the left and behind for the right-handed and contrariwise for left-handed. This precaution prevents the operator's hand from getting in the path of vision. The area of the windows should be in proportion to the size of the room. If it is necessary to screen windows, translucent rather than opaque shades should be used, for in the latter case necessary light may be excluded after the passing of the direct solar rays. Dark interiors and furniture are of no advantage in lessening glare, and naturally reduce the illumination, glare being often the result of contrasts. In general bad lighting means eyestrain and muscular fatigue, reduced output and more mistakes and wasted material.

Predisposing Factors of Rigg's Disease. W. H. Scherer, Houston. The Texas Dental Journal, August, 1921, xxxix, 8.

It is unfortunate that there is no unanimity of opinion concerning the etiology of this affection, but we now have a nomenclature which facilitates discussion of the subject. Affections of the tissues immediately investing the teeth are termed collectively Periodontoclasia and comprise recession of the

gums, gingivitis and pericementoclasia. The two first named are affections of the free border of the gum. Pericementoclasia is expressed clinically by so-called pocket formation in which the alveolar bone is affected only secondarily. In primary alveoclasia the bone is attacked without previous implication of the pericementum. In this affection pockets do not form but the tooth becomes loose from want of support. Periodontal abscess is one of two types, one of which is apical and due to pulp disease and has nothing in common with pyorrhea, while the other is parietal and may arise either in the pericementum or gum. After consideration of this nomenclature it is evident that diametrically opposed conditions leading to similar results might both be classed under Rigg's disease. However, primary alveoclasia with recession and loosening of the teeth is not a form of pyorrhea, which is an affection originating in the pericementum—a suppurative pericementoclasia, which is due to the cooperation of a number of factors which may be summed up as abnormal general conditions, mechanical and traumatic factors and bacterial invasion. The latter is responsible for the element of suppuration, but this does not occur save in the presence of other factors as indicated above.

Some Mouth and Jaw Conditions Responsible for Defects in Speech. James Sonnett Greene. *Medical Record*, July 2, 1921.

Dentistry plays a very important rôle in speech. The usefulness of the tongue in this respect has been somewhat exaggerated because in disability or absence of this organ others can to some extent take over its functions. The dentist is chiefly concerned with the rôle of teeth and palate in articulation. Defects of the lips seldom give much trouble. Of the two structures the teeth and palate, the latter is far more important because the roof of the mouth acts as a sounding board; but the connection between the palate and teeth is so intimate that there cannot very well be therapy directed to one of these structures alone. Anomalies of tooth position cause changes in the palate and also incidentally interfere with the movements of the tongue in speaking. In pronounced overbite it is difficult or impossible to pronounce the labials because the lips cannot be approximated. In pronounced underbite the interference with speech is of the same character. Inability to pronounce the sibilants may result from the absence of the incisors, upper or lower. Difficulty in the pronunciation of the dentals is due to imperfect alignment of the teeth, these consonants having a hissing sound. In certain cases *t* or *d* is actually given the *s* sound. The author goes extensively into the speech defects which accompany hare-lip and cleft-palate. It is not generally known that all cleft-palate patients are tone-deaf.

Arthroplasty of the Jaw. James M. Neff. *Surgery, Gynecology and Obstetrics*, July, 1921, xxxiii, 1.

The author reports a rather unique case of ankylosis of 7 years' duration, which had developed in an attack of uremic coma of the latter months of gestation. She had at the time a badly infected mouth with much pus which probably had come from around the teeth. The ankylosis was already present

when she came out of the coma and some teeth had to be extracted in order to feed her. She was left with a chronic nephritis and a high blood pressure—up to 170 systolic—her present age being only 39. The present condition of her mouth, up to the time of the arthroplasty, shows large abscesses and loosened teeth. Aside from the extractions mentioned above there had been no dental work. Before the arthroplasty the teeth were treated by removal and drainage of the alveoli, whereupon it was found that the nephritis had been greatly benefited. The albumin sank to a trace, with only an occasional cast. The blood pressure also came down and remained so. The x-ray of the joint did not permit of a precise diagnosis of the ankylosis—whether intra- or extra-articular. There was some retraction of the chin, the lower incisors being posterior. It was finally decided that the jaw had been fixed from without. Operation showed the joint to be normal within. Division of the two muscular attachments did not mobilize it. The left condyle and a bit of the neck were then resected and the jaws then opened. The condition was treated as an open wound and no attempt made to interpose any tissues between the bones. The mechanism of fixation was not entirely cleared up but was assumed to be the result of an abscess in the cheek with secondary scar-tissue formation involving the internal pterygoid muscle.

Dental Caries and Nutritional Therapy. E. Pohl. *Zahntechnisches Reform*, July 24, 1912, xxv, 30.

There is a concerted attempt throughout the world to raise the average of the public health. One of the most rational and practicable methods of accomplishing this end is dietetic therapy. At first sight the superior condition of the teeth in the uncivilized, whose dietetic resources are often poor, seems incongruous; for while one set of savages have to subsist chiefly on fat another eats protein in excess and a majority of all live largely on carbohydrates, yet all have good teeth. But irrespective of the question of frequency, caries is universal. The first attempt to connect caries with diet had reference to excessive use of carbohydrate especially sugars. The only classes of ingesta which bear a possible reference to caries are the carbohydrates and, among the inorganic constituents, the calcium. The first named can be fermented in the mouth to lactic acid through the aid of bacteria and under normal conditions this should be neutralized by the ammonia which is derived from the ingested albumin. In lime starvation there is said to be rapid development of dental caries. Lactic acid is also formed in the blood in metabolic disorders. In acid mouth it is assumed that there is unneutralized lactic and other acids which attack the teeth. The author introduces another element to explain the connection between diet and caries. He believes that in metabolic disorders the mucous glands of the mouth have to eliminate certain incompletely oxidized products which cause hyperemia and the formation of an abnormal and tenacious secretion. These in turn facilitate bacterial activity and weaken the natural defense of the parts, so that the development of caries is favored.

The Röntgenogram as an Index of Irritation or Infection of Dental Origin.W. A. Lurie. *The Dental Summary*, August, 1921, xli, 8.

Dental radiography was the starting point of wholesale tooth extraction. A great blunder was made when radiograms of known infection were not controlled by plates of suspected and normal cases. On the other hand not to take plates is also reprehensible. Experience of one dentist in this field is not sufficient for a standard and each should have access to the work of a group. A plate considered by itself without the clinical history would be very misleading; it is necessary to know whether the case is acute or chronic, whether an operation has been performed, etc., before one can venture to interpret. The stage of development due to age must be known, although it is of course possible to recognize the age to a certain extent by the radiogram. Infection and irritation are much less significant in a young subject than in an old one. There is not only more tolerance but a greater degree of regenerative power. Even insignificant degrees of infection and irritation become serious when they have persisted over long intervals.

The author's indications for removal of teeth relate on the one hand to the age and vigor of the subject and on the other to the duration and symptoms. The young and vigorous subject who has great regenerative power is also able to resist toxemia. In lowered vitality a quiescent focus may become active, but merely advancing age may have the same effect. Regenerative power begins to diminish as early as the puberty period, while tolerance does not diminish until toward forty. The author would not extract in a young subject but would make use of conservative treatment, provided there was a single small focus; if there were several he would do some extraction and some conservative treatment. In middle life he does not practice routine extraction, but keeps the subjects under observation.

The Results of Surgical Treatment of Epithelioma of the Lip. W. E. Sistrunk.

Ann. Surg., 1921, lxxiii, 521. (Per Surg., Gynec. & Obst.)

The author made this study to determine the results of operation for cancer of the lip after a lapse of from five to eight years. The results in this group of cases differ somewhat from those previously reported by Judd and Beckman.

A great difference is to be expected between the results in cases in which the glands are involved at the time of operation and those in cases in which operation is performed before glandular involvement can be demonstrated. The best results were obtained when the glands that drain the lip were removed as a prophylactic measure.

The lymphatic drainage from the lower lip passes through the submental lymphatics which drain the central portion of the lower lip and the submaxillary lymphatics which drain the remainder of the lip and the anterior portion of the cheek. On account of the free lymphatic anastomosis it is necessary to remove the glands on each side.

In small growths the glands should be removed first, and the growth on

the lip immediately afterward. If the growth is extensive and a large portion of the lip must be excised, it is best to remove the glands first and the growth about three or four days later. The growth may be removed first, but occasionally infection delays removal of the glands.

The technic employed in removing the submental and submaxillary glands is as follows:

The incision, parallel to the lower jaw about midway between the upper portion of the thyroid cartilage and the symphysis of the jaw, extends from the inner border of the sternomastoid on one side to a similar point on the opposite side. The skin and platysma muscle are reflected upward as high as the jaw bone, and all of the glands and fascia of the submental region are removed. The glands, fascia, and fat, including the submaxillary and salivary glands, are removed from the submaxillary region. The ducts of the salivary glands are cut off just underneath the mylohyoid muscle, and the facial arteries and veins are cut off at the level of the digastric muscle and again at the point where they cross the lower jaw bone.

It is necessary to guard against injury to the lingual branch of the fifth nerve, to the hypoglossal nerve, and to the inframandibular branch of the seventh nerve. The hyoglossus muscle forms the base of the submaxillary triangle. All the fat down to the muscle should be removed.

If the glands on either side of the neck are involved at the time of operation, all the glands draining that side of the neck should be removed by a block dissection. The glands and fascia from all the triangles are removed as high as the styloid process. The dissection extends down to the deep muscles of the neck, the glands and fascia lying along the carotid artery and the jugular vein being removed. The phrenic nerve, brachial plexus, common and internal carotid arteries, and the hypoglossal, vagus, and sympathetic nerves should be avoided. The omohyoid and sternomastoid muscles are removed and the spinal accessory nerve sacrificed. If the internal jugular vein is involved on one side of the neck, it may be removed.

In reviewing the histories of the patients, only those who had primary operations at the Mayo Clinic during the years 1912, 1913, and 1914 were considered. After dropping from the series the cases of recurrence, incomplete operation, and those in which no data were obtained after the operation, 136 cases remained. These the author classifies in three groups.

Group 1 comprises 98 cases in which a primary complete operation was performed when the glands were not involved; that is, a local excision of the growth with the removal of the glands draining the lower lip. Fourteen of these patients are dead, 5 from diseases other than cancer. Three letters were returned marked "deceased" without further information. Six patients died of recurrence. Excluding the 5 cases of death from disease other than cancer, 93 patients remain and there were 9 deaths from known recurrences; consequently 90.3 per cent are alive from five to eight years after the operation.

Group 2 comprises 11 cases in which the glands were involved at the time of operation. In 6 cases a block dissection was done; 5 of these patients are dead, and 1 is alive five years and three months after the operation. In the

other 5 cases, on account of the patient's age or physical state, block dissections were not done, only the involved group of glands being removed. Four of these patients are dead and 1 is alive five years and eight months after the operation. Of the 11 patients, only 2 (18.1 per cent) are alive five to eight years after the operation.

Group 3 comprises 27 cases in which, usually on account of the patient's age or physical condition, the operation was restricted to excision of the growth only. Three patients died from disease other than cancer of the lip. After deducting these 3 cases, 24 remain, among which there were 5 deaths and 19 cures (79.2 per cent) five to eight years after operation.

The percentage of cures following operation was lower among the patients with glandular involvement than among those without such involvement. The percentage of five-year to eight-year cures when the glands were involved was almost identical with that obtained in cases of cancer of the breast in which the glands were involved. The percentage of local recurrences after operation seems too large. This probably could be decreased to a certain extent by wide removal of the growth and the use of radium after operation. Rapidly growing epitheliomata are best removed with the actual cautery without a plastic operation at the time.

Treatment of the growth by means of radium and the x-ray, without removal of the glands, does not seem a radical method. Radium often destroys the growth but such a procedure is almost identical with the methods in which the growth is removed with pastes or by local excision. Although there may be no local recurrence following the latter procedures, in about 20 to 30 per cent of the cases metastasis occurs later in the submaxillary and submental glands.

Salivary Calculus in an Acromegalic. C. Jones. *Ann. Surg.*, 1921, lxxiii, 527.

The author reports the case of a woman, 56 years of age, who had a tumor under the right jaw. The patient, an acromegalic of marked degree, had first noticed a hard painful swelling beneath the angle of the right jaw two or three years before her admission to the hospital. Two months previously this swelling became suddenly enlarged, inflamed and very tender. After the application of hot poultices the condition subsided. At the time of the patient's admission to the hospital a hard mass about the size of a walnut was found just below the angle of the right lower jaw, to which it was apparently attached, and though it was slightly mobile the mass suggested a skeletal exostosis associated with the acromegaly.

X-ray examination, however, revealed an opaque, probably calcified body which was not connected with the jaw. The shadow measured 24 by 32 mm. The entire lesion was removed under local anæsthesia. The pathologic examination showed an indurated submaxillary gland containing within a cavity lined with a definite membrane an irregular yellow mass of calcareous substance. This cavity communicated directly with Wharton's duct, and the calculus could be readily felt with a probe passed down the lumen of the duct.

Its weight was 9.4 gm. On microscopic examination the surrounding tissues showed a chronic inflammatory process with increased fibrous tissue.

Salivary calculi are formed from the inorganic salts in solution in the normal saliva. Under abnormal conditions these are usually deposited on the teeth as tartar, but occasionally in the salivary ducts or acini as calculi. The calculi may have bacteria, epithelial débris, or a foreign body as nuclei. The inorganic salts concerned are the carbonates and phosphates of lime, potash, and magnesium. Bacterial action or the lodgment of a foreign body sets up an inflammatory process around the orifice of a duct or acinus which causes blocking, constriction, or roughening, and the decomposition of the saliva with consequent deposition of the salts. Calculus formation gradually results, the final stage being a stone which later may be ejected if it is not of large size. Of 37 stones, Czygen found 22 in Wharton's duct, 4 in the submaxillary gland, 5 in Stenson's duct, 1 in the parotid gland, 4 in the sublingual duct, and 1 in Bartholin's duct.

Complications of salivary calculi, if untreated, may be serious. Abscess formation is the most common. Fistula may result, and necrosis of the jaw may follow a large abscess. Occasionally small stones may be removed from within the mouth but as a rule an external incision is necessary. In the diagnosis sialolithiasis must be distinguished from root abscess.

Lymphatic Varicosities of the Buccal Cavity. Chompret and Croquefer, Paris. *La Revue de Stomatologie*, July, 1921, xxiii, 7.

The authors report a personal case with extreme minuteness. The patient was a girl of 13 with a chronic tumefaction in the left cheek which was not only disfiguring but interfered with mastication and caused her to bite herself. The child had suffered from repeated angina including true diphtheria and from caries of the deciduous molars followed by abscessing. During attacks of whooping cough, measles and scarlet fever she suffered in the mouth and so much of the time did she complain of sore throat that it was difficult to trace the beginnings of the tumefaction. It was also difficult to trace the evolution of first and second dentition; one could not be sure that some of the buccal troubles were not of dental origin, aside from the known occurrence of dental abscesses. She had had her tonsils removed toward the last, and had also had considerable dental work done.

On inspection the tumefaction was seen to run from the left labial commissure to the 12 year molar. The body of the mass did not project much above the level of the mucosa but it was surmounted by a number of nipple-like prominences along the upper margin. Below, the mass was lost at the furrow between the cheek and gum. The nipple-like prominences which were scattered along the upper margin resembled vesicles. Similar formations could be made out on the continuous intact mucosa. One of the authors had reported a similar case twenty years before. From a biopsy specimen taken from one of the nipple-like processes the diagnosis was made of lymphangiectasis.

Predisposing Factors of Rigg's Disease. S. B. Riggs, San Antonio. Texas Dental Journal, August, 1921, xxxix, 8.

As a rule this affection begins at the gingival border and extends to the apex of the tooth. The causal factors from the dentist's viewpoint are mal-occlusion, poor dental work, poor contact points, traumatism and buccal flora. From the angle of the medical practitioner there are other predisposing factors, lowered resistance from any cause, constipation, renal disease, occupation and environment, salivary type, etc. The author is inclined to stress the latter. If the saliva be deficient in ptyalin, there will be a residue of carbohydrate food, maltose, starch, etc., mixed with mucin, deposited around the necks of the teeth and in the interstices. To these residues are added the activities of saprophytic and pathogenic microorganisms. The latter are known to reproduce themselves at the rate of twice an hour and apparently it is the toxin thus generated which behaves as the irritant of Rigg's disease. The initial step is a gingivitis and with this comes a retraction of the gum and a bacterial invasion of the peridental membrane. With an excess of germ life and a minus state of resistance of the tissues, the bone is involved. The formation of serumal calculus is a sort of by-product, not to be understood as a causal factor. In animal experiment pyorrhea can never be caused by inoculation of virulent pus. It is claimed that experiment along these lines may cause loosening of the teeth in small laboratory animals, and that these loose teeth may be tightened up by diet and stimulation of the emunctories.

Relations Between Nasal and Dental Affections. J. D. Echemendia. Revista Medica Cubana. July, 1921, xxxii, No. 7.

The author, a rhinologist, reports five cases of this association. In the first, there was obstruction of both nasal fossae, which was complete on the right side, incomplete on the left. There was chronic pharyngitis. The reporter, who is not himself a dentist, learned that the patient had no complaint to make of her teeth, but she had not been to her dentist for two years. As there was some tenderness on pressure he referred her to her dentist and the latter found a fetid collection of seropurulent fluid of dental origin. He kept her under dental treatment for two months, at the end of which time it was found that both nasal chambers were clear. The second patient, under rhinologic treatment, had hypertrophy of the lower left turbinate bone, vasomotor rhinitis and pseudoasthma of bronchial origin. The patient had had some bridge work done which led eventually to periostitis above the amputated canine upper teeth. Under dental and rhinologic treatment the nose became normal. The third case presented the association of intranasal and dental anomalies, the latter due to bridge work. After the bridge had been taken out and an abscess opened and drained the nasal symptoms improved. The other cases were similar in character and the entire material leaves no room for doubt that infected roots and consecutive suppuration in the upper jaw cause much irritation of the nasal mucosa with simulation of hay-fever, false asthma, neuralgias, etc., produced by reflex mechanism. The swelling of the turbinals was probably of the same nature.

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EDITORIALS

Dental Nomenclature

WE HAVE before us a complete report of the Committee on Nomenclature of the Dental Editors Club of America as presented by Doctor L. P. Anthony, Chairman.

Before making a report on the actual work of the committee and names which were considered by them, Doctor Anthony states that "The literature of a profession is its life-blood. It is the medium which, circulating through the professional structure, provides for that interchange of ideas essential to its development and growth. Through its literature, also, each profession becomes acquainted with the state of development of its sister professions and each profession is judged as to its intellectual stature and the variety of its accomplishments by its literature. So also are the scientific status, exactness of knowledge, cultural developments and mental habits of the profession distinctly reflected by its literature and the retarding influence of insufficient

and defective vehicles of expression must be removed if we are to keep pace with the other learned professions."

This quotation taken from Doctor Anthony's report expresses the importance of a correct and scientific nomenclature, and one which is in keeping with other professional organizations.

Dentistry has been too prone in times past to adopt and use terms which have not been recognized by other scientific organizations. This condition is also recognized by the committee referred to, as is shown by the following quotation: "Any effort, however, to standardize our nomenclature should be made with a full consciousness of the desirability of conforming it as closely as possible to the general laws of nomenclature as already accepted by the biological sciences."

Probably the greatest faults in dental nomenclature have been found in the field of anatomy, physiology, and pathology. These three branches of dentistry are necessarily closely related to other sciences and consequently it is necessary to use terms which can be recognized by any scientific man whether he be a dentist, physician, or a biologist.

During the last few years, more attention has been given to the question of pulpless teeth. A number of terms have been used by certain speakers and writers to describe pulpless teeth, because they wished to convey a certain impression to their audience and to the public. This is shown again by the report of the committee of the Dental Editors Club of America, a quotation of which we publish in full because it describes conditions as they exist: "Dead tooth, devital tooth, devitalized tooth. These terms dead, devital, devitalized, are correct when relating to the pulp, but are in no sense correct as above used. We suggest the term 'pulpless tooth,' which we find meets all the exigencies of the case except where there is a devitalized pulp remaining in the pulp chamber, and such a condition would call for a phrase rather than a concise term to indicate it clearly." We have long known that the use of the terms "dead tooth" or "devitalized tooth" was incorrect, because modern histology shows that because a tooth is pulpless it is not a dead tooth.

Speaking of anatomic terms, we find that Doctor Anthony's committee makes the following suggestion: "Acting on the suggestion embodied in the report indicating the desirability of conforming our nomenclature to that of the other biological sciences, we submit for consideration the use of canine for cuspid; premolar for bicuspid; first molar for sixth year molar; second molar for twelfth year molar; and third molar for wisdom tooth."

We have maintained that cuspid and bicuspid were terms recognized by no other scientists except dentists, in the sense that dentists use them. The so-called cuspid is a canine regardless of the fact that some of our friends maintain that it smacks of a relation to the dentition of a dog. Nevertheless, a canine is a canine, and a canine it will always be in the biological world and dentistry, for a few men in dentistry cannot change the established scientific terminology of biological sciences. As regards the suggestion for the use of

premolar, instead of bicuspid, we have always claimed that the premolar was the scientific term for the tooth which succeeds the deciduous molar.

For some reason, we find that some men in the dental profession seem to believe that the term premolar is synonymous for the deciduous molar. We even find in dental literature, men speaking of "permanent bicuspid," when as a matter of fact all so-called bicuspid are permanent teeth. The proper use and understanding of premolar would eliminate such error.

The committee also recommended the use of mandible for lower jaw and maxilla for upper jaw in keeping with the action that was taken last year by the Dental Editors Club agreeing to use maxillary teeth instead of upper teeth, and mandibular teeth instead of lower teeth.

Another portion of the report, particularly interesting to those engaged in radiography, is a suggestion that the word *radiograph* be used as a verb, to indicate the x-ray process; *radiogram* (noun), the product of the process. The other terms recommended are of more interest to general dentistry than to orthodontia, oral surgery and radiography.

It was suggested by the Dental Editors Club of America that the National Dental Association appoint a committee on nomenclature, which suggestion was followed out.

For several years the American Society of Orthodontists has possessed a committee on nomenclature and some terms have been suggested which have been valuable to the science. However, in the face of the modern knowledge of nomenclature, it seems to be necessary to make radical changes in some of the terms, as adopted by the American Society of Orthodontists.

A great step forward was made when the terms, neutro-, disto-, and mesio-clusion were adopted, instead of Classes I, II, and III. Even at the present time we know of no better term to describe conditions of malocclusion as we understand them, than neutro-clusion. However, disto-clusion and mesio-clusion are not anatomically correct as describing the relation of the mandibular teeth when we accept the meaning of mesial and distal as used in the biological and medical sciences.

Dr. A. Hopewell-Smith of the University of Pennsylvania called attention to the incorrect use of the terms mesial and distal as employed by the dental profession in the last edition of *Tomes' Dental Anatomy*. At that time the *International Journal of Orthodontia and Oral Surgery* contained an editorial based on Dr. A. Hopewell-Smith's criticism of the terms mesial and distal. However, at the present time, after giving the matter some thought we believe that Dr. Hopewell-Smith is more correct in the criticism of the use of these terms than the dental profession is in their usage.

We believe that postero-clusion is a term more descriptive of the actual deformity that we are trying to describe, than is disto-clusion; and antero-clusion, a better name for the so-called mesio-clusion. When we consider the terms mesial and distal used in dentistry and as employed in biological and medical sciences, the dental profession has practically given the reverse meaning to the term distal when describing postero-clusion.

A Reply to "Who Should Control Dental Education"

October 22, 1921.

Dr. Martin Dewey, Editor-in-Chief,
The International Journal of Orthodontia and Oral Surgery,
501 Fifth Avenue,
New York, N. Y.

My dear Dr. Dewey:

I have been asked as President of the "so-called University schools" referred to in an editorial in the August number of *The International Journal of Orthodontia and Oral Surgery*, to reply to that singular communication. To meet *all* the errors of fact and judgment in this inverted piece of reasoning exceeds my powers as well as my patience. I beg leave, however, to point out a few of the worse misconceptions, as well as an outstanding error in argument. Possibly the lamentable weakness of dental education in cultural subjects at the time the writer of this article presumably gained his training, explains the juvenile cast of thought. It is difficult to account for on other grounds.

The weakness in argument I refer to is commonly called the "vicious circle," so commonly called, in fact, that I am surprised at the necessity I am under of pointing it out to an editorial writer for a magazine of such pretensions as *The International Journal of Orthodontia and Oral Surgery*. "The place which the dental profession has attained up to the present time has been the result of activities within the dental profession itself. . . . Therefore we believe that any movements to regulate dental education should be made by men in the dental profession who are best qualified to fill these positions." (What positions? Antecedent lacking!) As well say, Mr. Editor, "Medicine got along for a time without chemistry. Therefore let all chemists keep away from medicine."

As the Dental Faculties Association of American Universities (if you have that interest in exactness customarily attributed to members of the journalistic profession, you will be spared the further necessity of alluding to us as "whatever they call themselves"), we are presumably the group referred to in this statement: "we find a fourth group comprised of so-called 'university schools' which seem to think they should be allowed to control dental education because of their University affiliations." I must disclaim, for our organization, any attempt to "control" dental education. We seek merely to raise the standard in dental education to a higher level. This effort can hardly be disparaged. If you are familiar with the history of human thought and human progress, you will recognize that universities have long held it their duty, by virtue of being universities, to further human progress in every phase of education. An effort to raise the standard of dental education on the part of the university-schools, therefore, is no arrogation of authority; it is the mere fulfillment of a recognized duty.

Again you state: "we find another group of individuals who . . . are attempting to control dental education, as a result of their self-appointed authority. These men have been attracted to the dental field because of the importance which it holds at the present time and deem they are qualified to

make suggestions because of their financial backing." In amplification of these extraordinary statements you write: "In regard to . . . those of financial standing who have made suggestions regarding dental education, we believe they are absolutely unqualified, and we can see no reason why they should enter the dental field along educational lines, except that they have been attracted by the prominence which dentistry has attained at the present time and are a group of individuals who desire to be in contact with everything that is of importance. One of these men who claims to represent a large financial organization has taken it upon himself to attempt to suggest reforms to dental education . . . , etc." This can refer only to the survey of dental education recently undertaken by the Carnegie Foundation for the Advancement of Teaching. The spirit of the attack is too silly to merit an answer; I beg leave, however, to correct an error in fact. The Carnegie Foundation is by no means "self-appointed" in this task. At least ten years ago it was requested to make such a survey by the Dental Faculties Association of American Universities; and it has been asked at intervals ever since by other interested bodies, among them the Dental Educational Council. This body, which you laud so highly, is now co-operating heartily with the Foundation in its survey; and the National Dental Association which you likewise esteem qualified to "control" dental education, voted at its last meeting to give this survey its support. (The basis for your attack would thus seem to have shifted since the writing of your article.) The Dental Educational Council, furthermore, will probably, soon have among its members representatives from the Dental Faculties Association of American Universities.

With regard to your charge that the medical profession has no concern with dentistry, it is so far behind current thought that I cannot bring myself to undertake a reply. I refer you, if you are desirous of acquainting yourself with the scientific attitude on the subject, to the writings, among many others, of Doctor Charles Mayo of Rochester, Minnesota.

Inasmuch as your editorial questions the disinterestedness of the various bodies whose positions in the matter I have stated, I must ask of you the common editorial courtesy of printing my reply at an early date.

Very truly yours,

ALFRED OWRE,

President, Dental Faculties Association of American Universities.

Dental Education

IN THIS issue of *The International Journal of Orthodontia and Oral Surgery* is published a letter from the President of the Dental Faculties Association of the American Universities. The letter is in reply to an editorial in the August issue of this Journal, "Who Should Control Dental Education." We are glad that one in the exalted position of president of the above organization should take the time to cite some of his ideas regarding dental education at this time.

We have long been familiar with the work of the president of the above

organization and have realized the handicap under which the University of Minnesota is working with him as Dean of the Dental Department. A careful perusal of his letter proves the correctness of our judgment.

The writer of the letter is particularly aggrieved over the fact that we do not believe that the Dental Faculties Association of American Universities is the most ideal and uplifting organization in existence and that we should question its right to control dental education. The ideas held by some deans are so biased that it will take the profession years to overcome the harm they have done.

A great many men in the university schools are doing good and creditable work, but there are at least two schools, or rather two deans (of whom the Dean of the Dental Department of the University of Minnesota is one), that present a problem in the dental profession that is difficult to understand. State board results have amply demonstrated that students who graduate from university dental schools are no better educated than the students from the "private schools" which the universities consider such a detriment to the profession.

The gentleman from Minnesota disclaims any attempt to control dental education. Nevertheless, he believes in enacting such standards as to make it impossible for but a few students to enter the University of Minnesota, and he is trying to control dental education in the state of Minnesota to such an extent that the University of Minnesota is not rendering the service due the public who supports it. He says: "We seek merely to raise the standard in dental education to a higher level. This effort can hardly be disparaged. If you are familiar with the history of human thought and human progress, you will recognize that universities have long held it their duty, by virtue of being universities, to further human progress in every phase of education. An effort to raise the standards of dental education on the part of the university-school, therefore, is no arrogation of authority; it is the mere fulfillment of a recognized duty."

In answer to this quotation, we shall only ask the profession to remember what part the universities have played in dental education in the past and at what period it was that they became so anxious to raise the standards. They became interested after the "private schools" had built up dental education to the point where dentistry was a credit to all. If one will go back into the history of the dental profession, he will find that universities were not the first to teach dentistry. Not until the teaching of dentistry was placed on a firm and well recognized basis, not until private individuals and men in the dental profession had established dental schools, did the universities become interested in this phase of education. In other words, instead of being organizers, they are simply followers. Not until some one has inaugurated and proved the necessity of a thing does the university ever make a step forward.

The beginning of dental education is probably beyond the memory of most of the men in the dental profession today; however, the question of postgraduate instruction is a matter of more recent origin. We wonder whether the profession has observed the plans for postgraduate work made by the university-schools. Several universities have attempted to give postgraduate

work and it has been, in most cases, simple undergraduate work with the name "postgraduate" added to it. This statement does not apply to the University of Minnesota, Dental Department, but we have before us a publication from that University which will show what the Dean is sanctioning in postgraduate work. Like many other courses, postgraduate work in universities was not attempted until private individuals had given it a standing that made it advantageous for the universities to undertake. In an announcement of the University of Minnesota "General Extension Division, Short Courses for Dentists, College of Dentistry," a short course in Prosthetic Dentistry is featured. While this is a valuable course, it was never given in the university until its worth had been established by private individuals. Dr. M. M. House, of Indianapolis, is named to conduct these short courses in Prosthetic Dentistry, and it is true that he has a nation-wide reputation as a specialist; but it will be recalled that he obtained his instruction in Prosthetic Dentistry through private courses in private postgraduate classes. This is simply cited to show that universities are followers and not inaugurators, yet they attempt to control everything that is of value in dental education. They argue against the giving of private postgraduate courses, but the very courses they advocate were previously given by private individuals and after the necessity of such postgraduate work has been established, the university-schools attempt to control such instruction. Still the President of the Dental Faculties Association of American Universities contends they are only trying to raise the standards.

In reply to the argument advanced in the August editorial that dentists should control dental education, a ridiculous statement is made that "Medicine got along for a time without chemistry. Therefore let all chemists keep away from medicine." While the writer of the letter supposed that he was clever and witty in making that statement, nevertheless, he spoke much truer than he imagined. We contend today that physicians should control medical education. Medical education should not be controlled by chemists. However, at the present time we have a chemist trying to set standards for dental education. We still contend that the medical profession has no right to regulate the profession of dentistry simply because some few medical men have recognized the importance of dentistry. The reference made to Doctor Charles Mayo, of Rochester, does not prove that Doctor Mayo is fitted to control dental education. No one realizes that more than does Doctor Mayo himself.

As regards the Carnegie Foundation for the Advancement of Teaching, such organizations are more often working for the advancement of their own interests than for the interests of the profession that they attempt to investigate. At least, they are not prevented from working under misguided directors when they secure some one who knows little about dental education to investigate the schools. If the Carnegie Foundation for the Advancement of Teaching really desires to accomplish something, let it work in conjunction with the National Dental Educational Council.

The statement that "The Dental Educational Council, furthermore, will probably have among its number representatives from the Dental Faculties Association of American Universities" is interesting. This is probably true,

but the President of the Dental Faculties Association fails to state *why* the members of that organization have never cooperated with the National Dental Educational Council before. If he is willing to have those reasons stated, it certainly would be enlightening to the profession. We believe the less said about the National Dental Educational Council and the reasons the Dental Faculties Association of American Universities has not worked in conjunction with the Council, the better it will be for the president himself.

We still contend, regardless of the learned opinion of the gentleman from Minnesota, that dental education should be controlled by dentists. Furthermore, dental departments of state universities will serve the public much better if they have practical dentists as their deans, instead of highly cultured gentlemen who know little of dentistry.

If one will go back through the dental literature and read various articles that have been written by the President of the Dental Faculties Association of American Universities, he will find nothing about practical dentistry, but a great deal about high standards and culture; and after perusing the letter published in this issue of the Journal, we believe our readers will agree with us that if any group of men should not control dental education, it is one composed of this type.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The next meeting of the American Society of Orthodontists will be held in Chicago, Illinois, at the Edgewater Beach Hotel on April 24, 25 and 26, 1922. A very interesting and instructive program has been arranged by the Board of Censors, consisting of Clinics, Case Reports and Papers of unusual merit. Reservation should be made early in order to secure the best accommodations.—Ralph Waldron, Sec.-Treas.

Annual Meeting of Minnesota State Dental Association

The thirty-ninth Annual Meeting of the Minnesota State Dental Association will be held at the Minneapolis Armory, February 22 to 25, 1922. Walter H. MacNeil, President, Physicians and Surgeons Bldg., Minneapolis; C. H. Turnquist, Secretary, LaSalle Bldg., Minneapolis.

Keio University Establishes Medical and Dental Department

Keio University, one of the oldest and largest colleges of Japan, has added recently a medical and dental department. Dr. Mitauru Okada has been made head of the dental department. Dr. Okada is a graduate of Tokyo Dental College and holds an American degree of D.D.S. He has studied orthodontic engineering under F. L. Stanton and associated engineers, and has made the Japanese translations of this work. Dr. Okada will specialize in Orthodontia at 443 Ikebukuro Sugama, Tokyo, Japan.

Notes of Interest

Dr. Harold Chapman announces that on and after November 1, 1921, he will practice orthodontia exclusively at 15 Upper Wimpole St., London, W. I.

Doctor Ernest N. Bach announces the opening of his office at 1307 Second National Bank Building, Toledo, Ohio. Practice limited to orthodontia. Dr. Bach was formerly associated with Dr. Burt Abell.

Doctor B. L. Hyams announces the opening of his offices, Suite 206 Birk's Building, Montreal, Canada. Practice limited to orthodontia.

Dr. Harry B. Wright announces the removal of his office to Suite 402 Shubert Building, 250 South Broad Street, Philadelphia.

Dr. William A. Murray announces that after October 15, 1921, his practice will be orthodontia exclusively. 627 Grove Street, Evanston, Illinois.

Federspiel's Dental Polyclinic announces the removal of their offices from the Wells Building to their clinic building, Northwest corner Astor Street and Ogden Avenue, Milwaukee, Wis.

Dr. J. F. Spencer announces the removal of his office to Suite 319-322 Powers Theatre Building, Grand Rapids, Michigan. Practice limited to orthodontia.

Dr. L. Olive Cole formerly of 702 Boyd Building, Winnipeg, Canada, announces the opening of her new office, Suite A-The Roslyn. Her practice will be limited to orthodontia.

Mrs. Julia Barth Crecelins announces the marriage of her daughter Elizabeth to Doctor Joseph Ebert Johnson on Saturday, October 1, 1921, New Albany, Indiana.

Delay in November Issue

The publishers regret the delay in the publication of the November issue. They were compelled to hold the forms for important editorial matter.

The International Journal of Orthodontia and Oral Surgery

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VOL. VII

ST. LOUIS, DECEMBER, 1921

No. 12

ORIGINAL ARTICLES

ON THE PATHOLOGY AND DIAGNOSIS OF DISTOCLUSION*

BY B. E. LISCHER, ST. LOUIS, MO.

MODERN medicine has definitely demonstrated that practically every disease proceeds from an external cause and presents a specific set of chemical, functional and structural changes from the normal. The persistence of a former view, namely, that disease was often due to internal causes, gave rise to the confusion of disease with affection.

According to Roger,¹ "Disease is a morbid process considered in its entire evolution, from its initial cause to its final consequences; affection, on the other hand, is a morbid process considered in its final manifestations, apart from its cause. Take for instance, a man suffering from typhoid fever. The disease being over, the organism is restored to health. But the restoration is only apparently perfect; modifications persist which, too slight to be perceived, follow, nevertheless, their progressive evolution. Ten, fifteen, twenty years later, new manifestations break out—for example, some disturbances due to heart lesion. By that time the disease is almost forgotten, and, as no intermediate bond connects the actual manifestations with the disease left far behind, considerable difficulty is experienced in tracing the succession—some sort of repugnance to connect this cardiopathy with the long expired typhoid fever. In another case the subject will have been through a number of different diseases, and the physician will be at a loss as to which of them to attribute the new visceral disorder.

"From a philosophical point of view it is essential to reascend to the first disease. From a practical standpoint this inquiry is often useless. Whatever the etiologic conditions may have been, the effect is the same. Organic affections are simply cicatrices; disengaged from the initial cause, they become autonomous and develop on their own account. * * * The etiologic notion

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27, 1921.

is of no practical importance, but is indispensable to the nosologist who will even refuse to consider the affections of the organs as diseases.

"What is true of the heart is true of all viscera. Their affections take origin from some antecedent cause. For a long time this very simple truth has not been understood because the initial disease is not always easily found out; the visceral derangement may be the first outward manifestation, leading to the belief that it is making its appearance spontaneously.

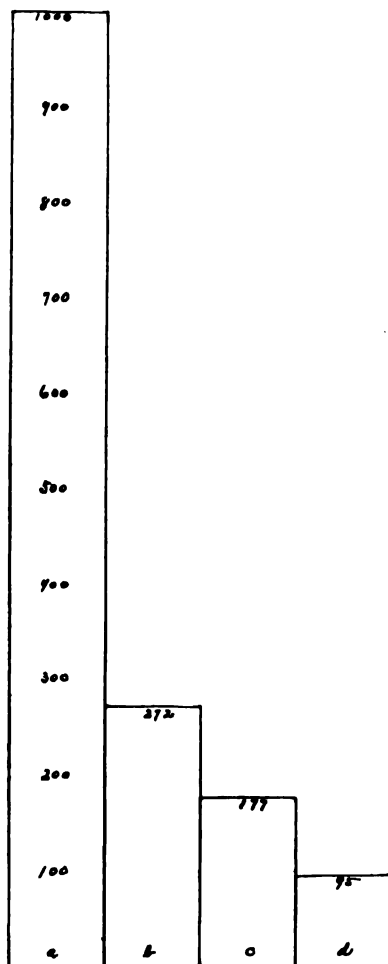


Fig. 1.—Diagram showing frequency of distocclusion in 1000 cases of oral deformity; (a) total number of cases; (b) total number of distocclusions; (c) total number of bilateral distocclusions; (d) total number of unilateral distocclusions.

"Morbid actions and reactions express themselves by functional modifications and structural lesions, which may be recognized during life or discovered only after death. The structural lesions, the study of which constitutes pathologic anatomy, must be considered as the result of functional disturbances; as we are taught in general biology that it is function that creates the organ, so in pathology it is proved that the disturbance of function is responsible for the organic lesion."

Dento-facial deformities constitute a group of abnormalities that arise as a result of some previous disorder and may be regarded as consequences. A first step toward a more intelligent comprehension of their nature is a general outline of their functional disturbances and structural modifications.

In discharging the task assigned to me today, I will attempt a restatement of established facts and present a summary of my experiences with one thousand cases of dento-facial deformity, of which two hundred seventy-two were of the kind under consideration, (Fig. 1).

DEFINITION

During our annual meeting in Excelsior Springs, Mo., 1917, on recommendation of the committee on nomenclature, the Society adopted the term *distocclusion* for all cases of malocclusion of the teeth that are "characterized by a distal or posterior relation of the lower arch to the upper arch." I believe a more exact and comprehensive definition is necessary at this time, and therefore offer the following:

Distocclusion is a dento-facial deformity characterized by a distal, or posterior, relation of the mandibular dental arch to the maxillary dental arch, but without extreme malformation of the jaws. Marked arrest of development, ankylosis or malposition of the mandible, or an anterior shifting of all, or part, of the maxillary arch, may present an apparent distocclusion; but in such cases the distocclusion should be regarded as a complicating symptom, and not as the determining factor that guides us in the selection of a specific term for the deformity.

A distal relation of the mandibular arch may involve both sides, hence the term *bilateral distocclusion* is advisable. When the affection is confined to one side, either right or left, the term *unilateral distocclusion* is employed. All other modifications encountered in this group of deformities and not specifically alluded to in the above definition, may conveniently be expressed by the addition of a descriptive phrase, e.g., bilateral distocclusion complicated by labioversion of the maxillary incisors; unilateral distocclusion complicated by perversion of the maxillary right lateral incisor, etc.

SYNONYMS

A review of the literature reveals the fact that this form of dental anomaly has been recognized by numerous writers, but thus far we have failed to establish any uniform convictions. As early as 1836 Kneisel² called attention to malrelations of the dental arches, and divided the various forms of "malposition of the teeth" into *partial* and *complete* anomalies. By the term *partial* he meant malposition of the individual teeth, and he refers to teeth occupying positions labial, mesial and distal to normal. The group of abnormalities embraced under the term *complete* he subdivided into: (a) cases which we recognize as a distal relation of the mandibular arch; (b) cases which we recognize as a mesial relation of the mandibular arch; (c) cases which, he said, presented an "edge to edge" bite.

In 1842, Carabelli³ suggested a more comprehensive classification and for the first time offered a fairly finished terminology. He also called attention to malrelation of the arches, described the temporomandibular articulation and enumerated the various movements of the mandible. He speaks of a "posterior bite" and suggests the term *mordex retrorsus*, but fails to illustrate a case of what we today call a distoclusion. His plates of mesioclusion and other forms of abnormality are, nevertheless, excellent. Magitot,⁴ Iszlai⁵ and Sternfeld⁶ complete the list of the earlier European writers.

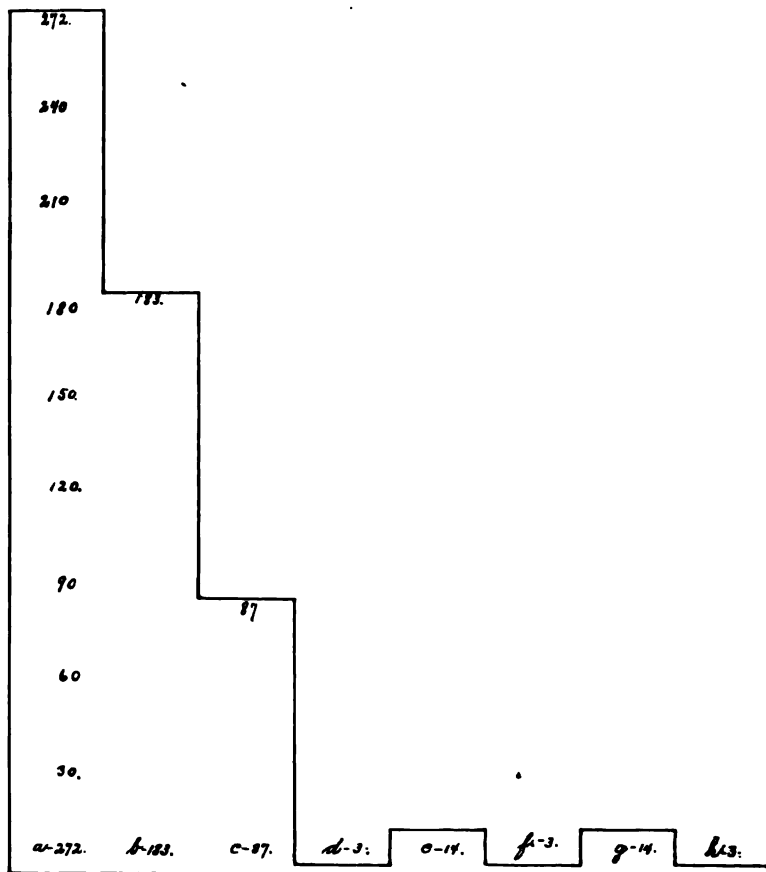


Fig. 2.—Diagram showing frequency of the various anomalies in distoclusion: (a) total number of cases; (b) labioversion of maxillary incisors; (c) linguoversion of maxillary incisors; (d) infraversion of anterior teeth; (e) deficiency of number; (f) redundancy of number; (g) fractures of maxillary incisors; (h) perversions. There was one case complicated by transversion.

Many classifications have been suggested since then, and some were based, at least to some extent, upon the morbid anatomy. Others were largely based upon the treatment to be instituted and were, therefore, fallacious. The more important of the former group were by the following writers: Angle,⁷ Welcker,⁸ Grevers,⁹ Herbst,¹⁰ Zsigmondy,¹¹ Villain¹² and Colyer.¹³

The term (?) *Class II*, suggested by Angle, gained wide recognition during the last twenty years and was defined by him as follows: "Lower arch

distal to normal in its relation to the upper arch." He divided this group into two divisions and two subdivisions as follows:

Division 1.—Bilaterally distal, protruding upper incisors.

Primarily, at least, associated with mouth-breathing.

Subdivision.—Unilaterally distal, protruding upper incisors. Primarily, at least, associated with mouth-breathing.

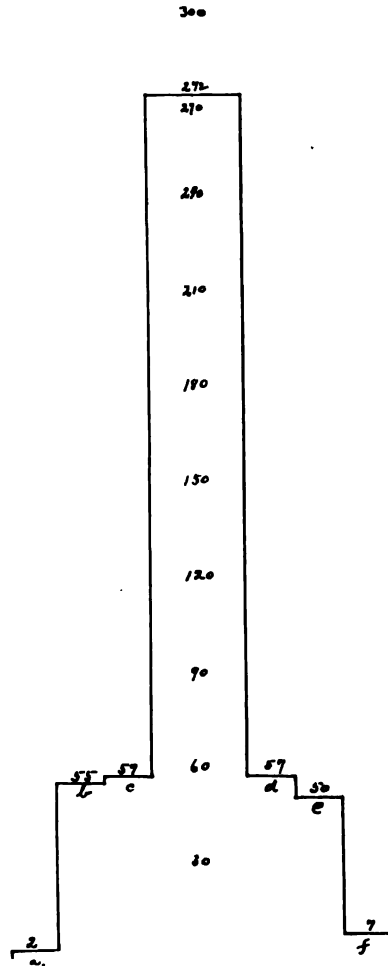


Fig. 3.—Diagram showing frequency of abnormal frenum labium in 272 distoclusions: (a) lower abnormal frena; (b) upper abnormal frena; (c) and (d) total number of cases; (e) with labioversion of the maxillary incisors; (f) with linguoversion of the maxillary incisors.

Division 2.—Bilaterally distal, retruding upper incisors.

Normal breathers.

Subdivision.—Unilaterally distal, retruding upper incisors.

Normal breathers.

As stated above, the term *distoclusion* (suggested by the writer¹⁴) has since been adopted by this Society.

FREQUENCY

So far as he has been able to determine, Angle and the writer are the only ones who have published any statistics on the relative frequency of this group of abnormalities. Angle's¹⁵ findings, based upon "several thousand cases," were as follows:

Class II—Division 1, 90 cases; Subdivision 34 cases;
Division 2, 42 cases; Subdivision 100 cases.

This makes a total of two hundred sixty-six.

In my collection of two hundred seventy-two cases of distocclusion in the first thousand, the following dental anomalies occurred (Fig. 2):

Distocclusion complicated by *labioversion* of maxillary incisors:

Bilateral forms 119; Unilateral forms 64.

Distocclusion complicated by *linguoversion* of the maxillary incisors:

Bilateral forms 56; Unilateral forms 31.

Distocclusion complicated by *infraversion* of the anterior teeth:

Bilateral forms 2; Unilateral forms 1.

Distocclusion complicated by *perversion*:

Bilateral forms 0; Unilateral forms 3.

Distocclusion complicated by *transversion*:

Bilateral forms 1; Unilateral forms 0.

Distocclusion complicated by *deficiency of number*:

Bilateral forms 8; Unilateral forms 6.

Distocclusion complicated by *redundancy of number*:

Bilateral forms 0; Unilateral forms 3.

Distocclusion complicated by *abnormal frena of the lips*:

Bilateral forms 38; Unilateral forms 19; with one abnormal frenum of the lower lip in each of these groups. Fig. 3.

But these figures are based upon the findings in *abnormal* dentures, hence it would be more instructive to ascertain the relative frequency of these forms in a thousand individuals taken at random. It is safe to assume that some would undoubtedly present normal dentures, and the percentages would thus be materially lowered.

AGE

The various ages of my cases are presented in the chart (Fig. 4). From this it will be seen that the greatest number of patients applying for treatment of distocclusion were nine years of age. But this again is an inaccurate index because it, too, ought to be based upon one thousand individuals taken at random; or, better still, an even number (say 100) for each year from 3 to 18. This would give us the relative frequency at any given age, and a probable clue as to whether distocclusion is in a measure a self-corrective abnormality. Such a statistical study of a span of 15 years, beginning with the completion of eruption of the temporary teeth to the completion of eruption of

the permanent teeth, would give us an intimation of the earliest stages of this deformity, as well as its probable decline as the individual approaches maturity.

SEX

In my 272 cases there were 109 males and 163 females (Fig. 5). These figures are of no practical value and the probable "influence" of sex (if any) can only be determined by an extended statistical study as outlined above.

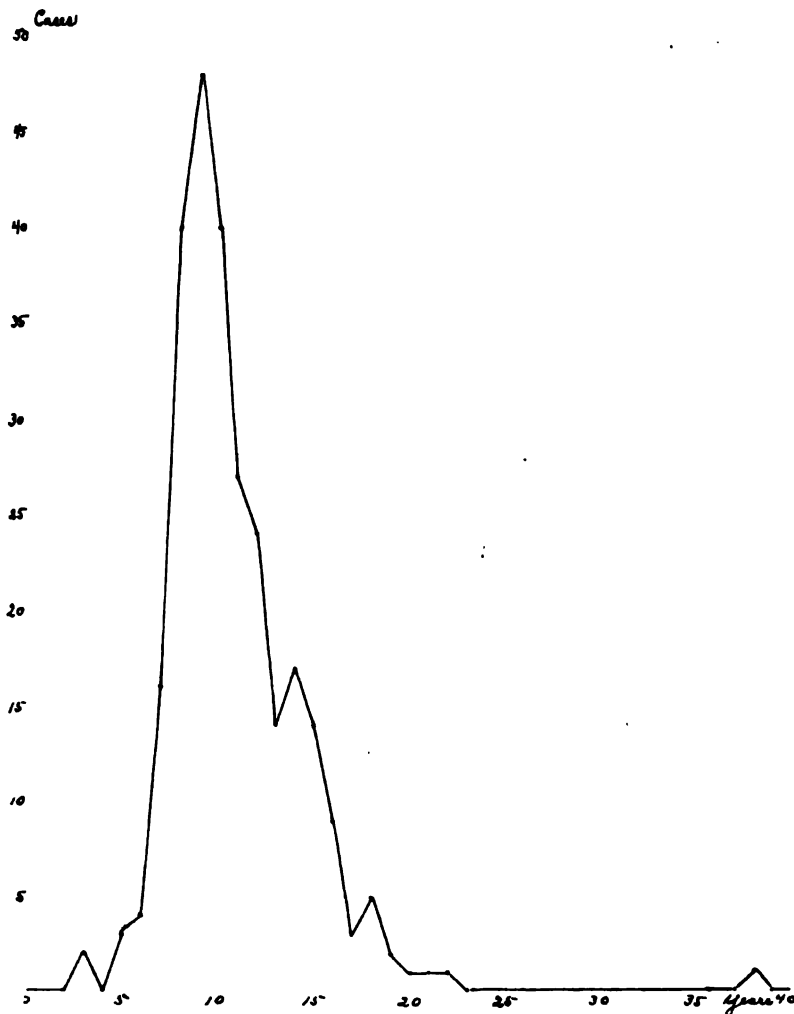


Fig. 4.—Age diagram of 272 distocclusions.

HEREDITY

As a causative factor heredity is not as readily accepted as formerly, and for very good reasons; but in my opinion we must continue to regard it as of very great importance, because it "repeats strength or weakness, good or ill, with like difference." (Jordan and Kellogg.¹⁶)

One phase of this vast theme stands out very prominently, namely, *all*

dental research thus far conducted is entirely inadequate to warrant any bold denial of the probable "influence" of heredity in the causation of dento-facial deformities. Many anomalies of other organs of the body (notably the eyes) are largely congenital and frequently transmitted from generation to generation. Surely, the teeth and jaws are not exempt from a process which undoubtedly exercises an influence over such maldevelopments.

"Our present plight seems to be exactly this, we cannot explain to any

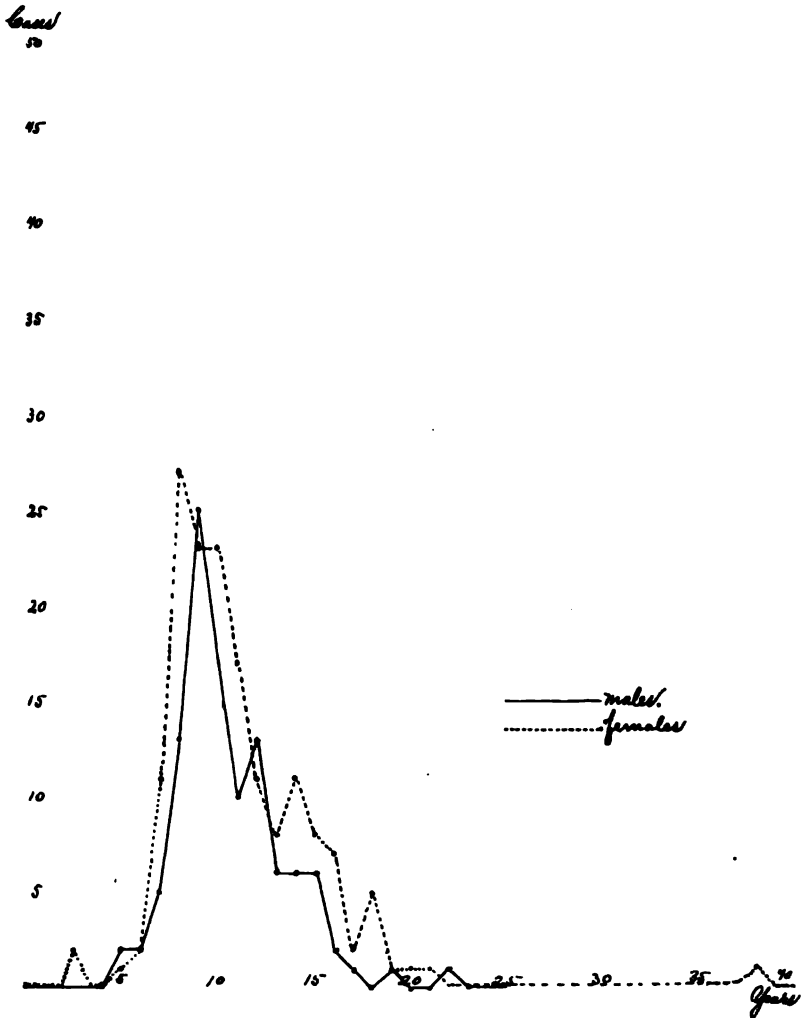


Fig. 5.—Diagram showing sex curve of 272 distocclusions.

general satisfaction" all the causes of malocclusion of the teeth without the help of some hereditary factors; "and on the other hand, we cannot assume the actuality of any such factor in the light of our present knowledge of heredity."

FUNCTIONAL DISTURBANCES

A very common functional disturbance in distocclusion, one that is easily recognized, is that of abnormal breathing, or mouth breathing (Fig. 6). Lay-

men generally regard the nose as the organ of the sense of smell, though its principal function is to serve as the intake of respiration. In normal, or nasal, breathing it cleanses the dustladen air we breath by means of the *vibrissae* and the secretions, the latter exercising a bactericidal influence on inhaled bacteria. Besides warming the air we breathe, the nose also increases its humidity. Normal breathing is a very important function of the living body and we now know that long continued mouth breathing affects the individual both locally and constitutionally, and its consequences may be carried into late life.

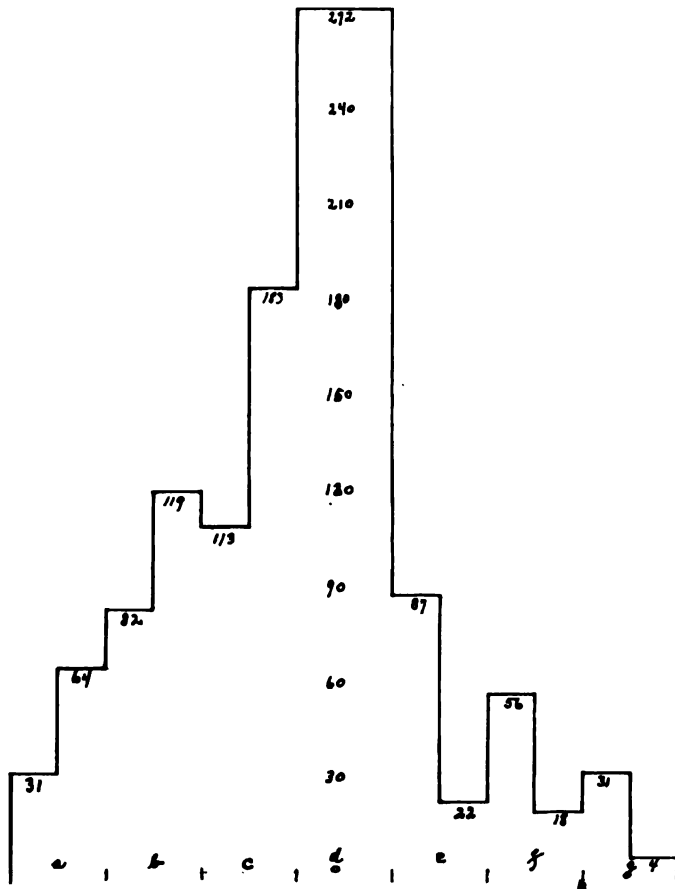


Fig. 6.—Frequency polygon of nasal obstruction in 272 distoclusions; (a) of 64 unilateral distoclusions with labioversion of the maxillary incisors, 31 gave a history of nasal obstruction; (b) of 119 bilateral distoclusions complicated by labioversion, 82 gave a history of nasal obstruction; (c) of 272 distoclusions 183 were complicated by labioversion, and of these 113 gave a history of nasal obstruction; (d) represents the total number of cases; (e) 87 cases were complicated by linguoversion, and only 22 of these gave a history of nasal obstruction; (f) represents the bilateral forms with, and without, nasal obstruction, and (g) the unilateral forms.

Mouth breathing causes a dry feeling in the throat which causes quick movements, grinding of the teeth and *pavor nocturna* (night mares) in children. *Enuresis nocturna* (bed-wetting) has also been attributed to mouth breathing, and cases are on record where adenectomy has brought about a cure. Loss of function in the facial muscles about the nose and lips are com-

mon, and the upper lip is frequently too short. Arrest of development in the middle third of the face is readily recognized. The lips chap easily, their mucous membranes become lacerated and the gums are predisposed to inflammation. The tongue becomes dry, insalivation is incomplete and the function of mastication is interfered with, because the mouth breather must gasp for air. Food is less appetizing and the habit of excessive drinking of liquids during meals is often acquired. This, as Czerny has pointed out, may lead to heart and kidney lesions.

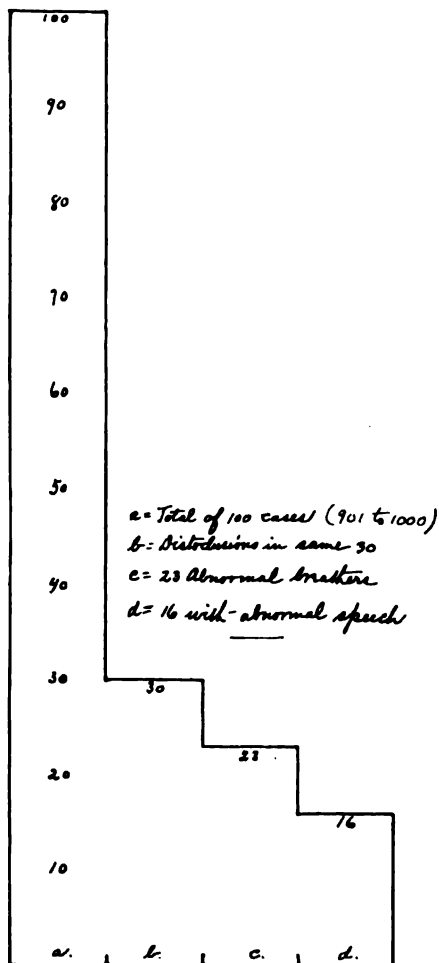


Fig. 7.—Diagram showing relative frequency of abnormal breathing and marked abnormal speech in distocclusion; (a) total number of 100 cases; (b) 30 distocclusions; (c) 23 abnormal breathers; (d) 16 with marked abnormal speech.

The dust-laden air inhaled directly through the mouth may cause inflammation of the tonsils, with bronchial and glandular involvement. Deformities of the thorax, inspissation of the apex of the lung, especially the right lung (Kroenig), are common. The circulation at the base of the skull and the emptying of the ethmoidal veins may even be disturbed.

Thus anemia, depression, dullness, dizziness, lack of concentration, inat-

tention, feeble-mindedness, headaches, the vacant stare and subnormal weight and stature are recognized as complications, and known as the symptom complex of Guey, or *aprosexia*.

The unequal muscular pressure in the mouth breather gives us the narrow, V-shaped maxillary dental arch with high palate. The mandible is held in place in normal breathers by muscular pressure and atmospheric pressure (Metzger, Herbst). In mouth breathing it drops down and back and consequently suffers in development, both as to size and form. According to Bloch, the fibers of the muscles of mastication are stretched during chronic mouth breathing and their strength is consequently diminished. The depressors of the mandible are said to hypertrophy.

In normal breathing we find a *positive* air pressure in the nose and a *negative* pressure in the mouth. In mouth breathing we find the reverse condition and hence an abnormal balance between air, muscle, tongue and masticatory pressure (Misch). Körbitz considers the influence of the tongue as most important.

Another functional disturbance frequently met with in dento-facial deformities, and one which is quite common in distocclusion, is that known as *rhinolalia* (Gutzmann). A normal resonance gives to the human voice its carrying qualities and when this is impaired (as it always is in mouth breathers) speech and song are seriously affected (Fig. 7).

Certain sounds are formed by forcing the air unhindered through the nose. In mouth breathers, the resonants: *m*—formed by closure of the lips; *n*—formed by a posterior tongue lock; are pronounced *b, d, g*, (Misch). Stammering is also met with.

Schroeder-Benseler maintains that normal nasal breathing is dependent on an ample width of the nasal floor, and this is dependent on the width of the maxillary dental arch, which, in his opinion, is definitely determined between the third and fourth years, and for which he gives the following measurements:

iii/iii	- 25 mm.
iv/iv	- 30 mm.
v/v	- 35 mm.
6/6	- 40 mm.
7/7	- 45 mm.
8/8	- 50 mm.

Landsberger also maintains that the width of the maxilla is dependent on the growth and development of the dental arch, because without teeth there is no development of the alveolar structures.

According to Misch,¹⁷ Zsigmondy and Körner differ with Schroeder-Benseler and maintain that growth continues beyond the age he mentions.

Talbot, Siebenmann, Grosssheinz, Fränkel and many others do not regard mouth breathing as a factor of great moment. Siebenmann and his pupils, in an extensive series of measurements, have tried to show the correlation between maxillary width and facial and head width. Accordingly, the former

is predetermined and in harmony with biologic law, and individuals may thus be grouped into the broad-faced, and long and narrow faced types. The former are called *chamaeprosopic* and are said to have broad, flat palates, termed *platystaphylinia*. The latter are called *leptoprosopic* and present high, narrow palates, *leptostaphylinia*. They regard palatal variations between normal and abnormal breathers as negligible and trace the causes to heredity and racial characteristics. Buser, Bloch, Frese, Halle and others have disputed these contentions, but regard a leptoprosopic cranial form as a predisposing factor (Misch).

Sundry variations and modifications of tooth eruption are now definitely recognized. The investigations of Cartwright, Dietlein and Röse, whose observations embraced 50,000 individuals, have shown racial, social or economic, and sexual variations. Thus eruption occurs earlier in the well to do and is retarded in the poor; eruption of temporary teeth before birth is rare; the temporary teeth of females average 31 days earlier than the corresponding teeth in males; the permanent teeth exhibit a similar secondary sexual variation amounting to $4\frac{1}{2}$ months. The $\frac{6}{6}$ vary least and $\frac{3}{3}$ most in their eruption, while $\frac{iv}{iv}$ and $\frac{5}{5}$ frequently exhibit a tendency to partial eruption. Rickets and cretinism usually retard eruption, whereas syphilis hastens the process. Retarded eruption of $\frac{3}{3}$ is frequently observed, and may be due to premature loss or prolonged retention of the temporary teeth. Difficult and tardy eruption is also quite common in $\frac{8}{8}$. Faulty diet, disuse, caries, pulpitis, pericementitis and otitis, during the period of the temporary dentition (i.e., from three to twelve years), undoubtedly modify the eruption of the permanent teeth, and very largely because they seriously disturb the normal functions of the teeth.

A statistical study of eruption in dento-facial deformities is desirable, so that we may know the behavior of teeth in this respect, and whether it differs appreciably from eruption in normal dentures. The writer has recorded in his office files the eruption of every tooth in all of his cases, but the time was too short to include a summary of his distocclusion cases in this paper. This is therefore postponed to some future report.

STRUCTURAL LESIONS

The most common local lesion in all cases of oral deformity is malposition of the teeth. It is rarely limited to only one, or two, teeth and usually involves several, or all, of the teeth. This causes anomalies of arch form and malocclusion, or abnormal antagonism. If we now recall that teeth do not come down into pre-existing sockets during their eruption, but complete their calcification and socket formation after they assume their anatomic relations in the mouth, we can readily understand why the alveoli surrounding malposed teeth suffer from abnormal development.

Malocclusion always means abnormal function and this invariably leads

to structural lesions. It may be stated axiomatically that only a normal mouth can perform normal functions; and by a normal mouth we mean a mouth of normal architectonic form, as well as one free from disease.

A priori, we therefore expect to find caries of the enamel and dentine in a large percentage of oral deformities. Of the last one hundred cases of my first thousand, a very complete record is on file in my office. Of this

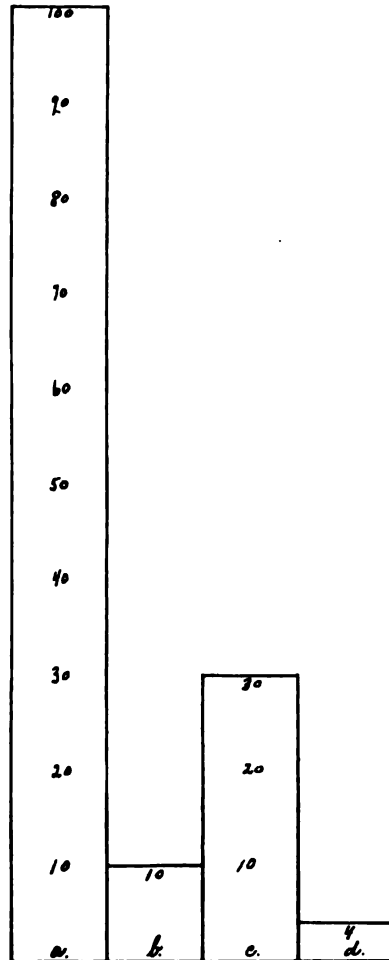


Fig. 8.—Diagram showing relative immunity to caries; (a) total number of 100 cases; (b) number immune to caries 10; (c) total number of distoclusions 30; (d) number immune to caries 4.

number thirty were distoclusions. Only four of these were found free from caries on first consultation (Fig. 8).

Obviously, if these lesions are neglected, pulp infection and all its sequelæ are sure to follow. These aggravate masticatory function and the lesions thus rapidly extend beyond the immediate alveoli.

Of the thirty cases referred to above, one presented hyperplastic enamel, two malacotic enamel, and twenty-seven had teeth of sclerotic structure; but most of these had minor restorations. This classification is entirely empirical,

but very convenient clinically. The importance of this subject certainly warrants extensive research.

Simple and chronic gingivitis are frequently met with, and are usually due to a faulty diet and faulty oral hygiene. Hypertrophic gingivitis has been found in two cases, and one of these was undoubtedly due to the malocclusion.

Pericementitis in all its forms, namely, simple gingivo-pericementitis, gingivo-osteo-pericementitis, proliferative pericementitis of the suppurative and nonsuppurative varieties, and atrophic pericementitis, have all been observed in the mouths of the older patients. These rendered the prognosis so very unfavorable that treatment was deemed inadvisable.

Deformities of the palate and arrest of development of the nasal passages

Fig. 9 —Section through a normal mouth showing relation of the tongue to the palate, and of the lips and teeth.

have already been mentioned (Figs. 9, 10, 11, and 12). The growth of the body of the mandible is frequently affected in distocclusions, and in some instances the rami, condyloid processes and even the glenoid cavity are involved to such an extent that more accurate methods of diagnosis will ultimately remove many cases from this group.

FACIAL MODIFICATIONS

Variations of the facial features, and of the jaws and teeth, have long constituted a subject of compelling interest to students of physical anthropology. Not infrequently, cases of oral and facial deformity have crept into their

reports as *variations*. Dentists and orthodontists have, on the other hand, looked rather lightly upon the *modifications* of these structures, and have almost unanimously interpreted oral deformities on an *exclusive occlusal basis*.

The facial modifications of distocclusion, as of every other kind of oral

Fig. 10.—Cross section through a normal tooth.

Fig. 11.—Section through an abnormal mouth, showing malrelations of the tongue, palate, lips and teeth.

deformity, are many and various; and the facts disclosed by a more intensive study do not justify the accepted narrow viewpoint, but demand additional methods, or aids, of diagnosis and description. The writer has long been convinced that extensive researches are necessary before final conclusions are permissible.

Heretofore, we have grouped them into the labioversion (mouth breathers) and linguoversion (normal breathers) divisions, and have ignored the major osseous lesions, and the infraversion form, Figs. 13 to 19. We have been content to remark, that in the unilateral forms the distoclusions of the facial

Fig. 12.—Cross section through an abnormal mouth.

Fig. 13.—Bilateral and unilateral distoclusion complicated by labioversion of the maxillary incisors.

lines were less severe than in the bilateral forms. That this is an inadequate method is clear to any unbiased observer. One looks in vain in our standard textbooks for a comprehensive description of the pathology and facial modifications of any type of oral deformity. On the other hand, if we re-read the

Fig. 14.—Typical facial modifications of bilateral and unilateral distocclusion complicated by labioversion. (Life size.)

chapters on treatment we frequently run across statements that are serious admissions, and that are of great value to the student of pathology. For example: "the lower jaw diminished in size and distal in relation"; or, "It seems reasonable to believe that the mandible is arrested in development"; or, "which would also prevent the normal growth and lengthening of the jaw," etc., appear in one paragraph. (Angle, pp. 449.)

Temporarily, the writer suggests dividing the facial modifications into *minor* and *major* deformities. The minor group might include all normal and abnormal breathers who present only *malrelation* and *malfunction* of the lips, with a normal amount of lip tissue and only slight arrest of development of the underlying osseous structures. In the major group more extreme cases are found, namely, those with pronounced malposition of the anterior teeth com-

Fig. 15.—Bilateral distocclusion complicated by linguoversion of the maxillary central incisors.

Fig. 16.—Unilateral distocclusion complicated by linguoversion of the maxillary central incisors.

plicated by extreme and prolonged malfunction of the lips and, therefore, marked structural changes. The underlying bony structures are also involved to a greater degree and, in the course of time, as our diagnostic methods become more accurate, some of these cases will undoubtedly be recognized as *micromandibular* and *mandibular retroversion* deformities.

Let us briefly analyze a group of so-called bilateral distocclusions, complicated by labioversion of the maxillary incisors. Time and space forbid a detailed analysis of other forms.

Fig. 20 shows two profiles exhibiting malrelation of the lips, with normal lip function and structure. They are normal breathers in spite of the labioversion of their incisors. A is a female eleven years of age who had adenoids and tonsils removed at ten years of age. She is 58 inches in height, weighs 85 pounds, has a mesocephalic head type, and artificial feeding was begun

Fig. 17.—Typical facial modifications of bilateral and unilateral distocclusion complicated by linguoversion. (Life size.)

after the seventh month. Her parents have normal dentures. *B* is a male of twelve years, who had a mastoid operation at seven years, is 65 inches in height, weighs 119 pounds, has a mesocephalic head type and artificial feeding was begun after 6 months. His parents also have normal dentures. Fig. 21 shows models of their dentures made at the time their photographs were taken. In Fig. 6 (C) we note 183 cases with the same type of denture (i.e., labioversion) and only 113 gave a history of nasal obstruction. Thus, 70 patients of this group gave a negative nasal history and were normal breathers in spite of the labioversion complication.

In Fig. 22, we note two profiles exhibiting malfunction of the lips with a marked tendency toward abnormal development of these tissues and their underlying bony structures. They were normal breathers but gave the fol-

Fig. 18.—Bilateral distoclusion complicated by labio-infraversion of the maxillary incisors.

lowing histories: *A* is a male of thirteen years, of mesocephalic head type, height 61 inches, weight 95 pounds, whose parents have normal dentures and who has had no operation for nasal obstruction. (No record of feeding during infancy.) *B* is a boy of nine years, height 55 inches, weight 69 pounds, of dolichocephalic head type, whose parents have malocclusions. A rhinologic examination revealed only a slight hypertrophy of the right upper turbinate. He was bottle fed from birth, is extremely nervous, has diabetes and bites his lower lip. Their dental models are shown in Fig. 23.

Fig. 24 presents two abnormal breathers with consequent abnormal lip function, but normal lip structure. *A* is a boy of eight years, height 52 inches, weight 69 pounds, dolichocephalic head type, who was fed on the bottle from birth. He suffered an attack of bronchitis during infancy and had adenoids and tonsils removed at two years of age. His mother and two older brothers

Fig. 19.—Typical facial modification of distocclusion complicated by infraversion. (Life size.)

a malocclusion. *B* is nine years of age, height 54 inches, weight 70 pounds, had bronchitis at 10 months, and after an attack of otitis media had adenoids and tonsils removed. After continued mouth breathing the adenoids and tonsils were removed a second time, but he still suffers from mouth breathing and sinus trouble. He was bottle fed. His father has normal teeth and mother has malocclusion.

In Fig. 28 we note abnormal lip function and marked arrest of develop-

*A**B*

Fig. 22.—Malfunction of the lips tending toward malformation of their structure, but normal breathers. *A* is a male of 13 years; *B* is a male of 9 years. (One-fourth life size.)

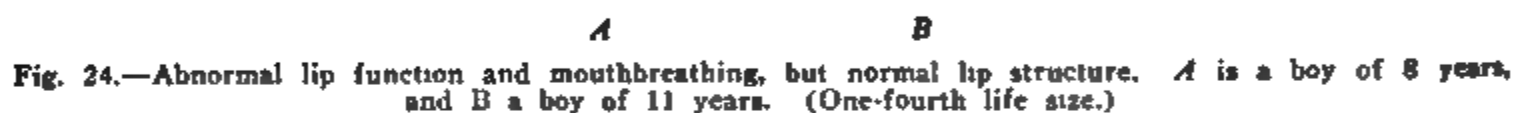
*A**B*

Fig. 23.—Dental models of cases shown in Fig. 22.

ment of the upper lip. The labioversion of the maxillary incisors is extreme and the bilateral distoclusion complete and pronounced (Fig. 29). Notwithstanding this anomalous denture, there is a well-developed chin present, denoting normal mandibular development. The relation of the mandibular dental arch to this mandible is undoubtedly distal, or posterior, and the case is a true distoclusion of advanced type, the patient being eighteen years old. The nasal history of the patient is negative, but she sucked her thumb for

several years. However, her older sister was also addicted to this habit and has a normal denture. The head type is dolichocephalic, the patient's height is 65 inches, weight 115 pounds, and she was breast fed. The father had normal teeth but is now edentulous. The mother has a normal denture.

Fig. 30 shows the photographs of a girl eleven years old, with mesocephalic head type, height 57 inches, weight 75 pounds, who has had recurrent attacks of rhinitis, but no operation for nasal obstruction. Her mother and younger brother have malocclusions, and the father has a normal denture.



The dental models of this case are shown in Fig. 31. The important facial features are the short upper lip and poorly developed mental eminence of the mandible.

Fig. 32 shows another girl of eleven years, height 59 inches, weight 88 pounds, with brachycephalic head type. She was fed artificially during infancy, had bronchitis, and adenoids and tonsils were removed at ten years. Mother has malocclusion and father normal teeth. The face presents abun-

dant length, longitudinally, especially in the mandibular area, but the mandible is too short horizontally. This patient is still under treatment and it is hoped that the development and eruption of the mandibular third molars will promote mandibular growth. The dental models are shown in Fig. 33.

That the rami are at times involved is evident to all experienced observers. Fig. 34 shows the facial views of a boy ten years old, of mesocephalic head

A *B*

Fig. 26.—Mouthbreathers with abnormal lip function and structure. *A* is a boy of 11 years, and *B* is a boy of 9 years. (One-fourth life size)

Fig. 27.—Dental models of cases shown in Fig. 26.

type, with a history of artificial nursing, and adenoids and tonsils removed at nine years. He is a normal breather, however, and the distoclusion and its complicating labioversion are not extreme. A marked malrelation of the lower lip is readily recognized, as well as the pronounced deficiency of the mentum in two dimensions. His height is 57 inches, weight 84 pounds, and his mother and younger brother have malocclusions. The dental models are shown in Fig. 35.

have convinced me of the wisdom of extending the classification of oral deformities and hence the term: *micro-mandibular deformity*. The patient is a boy of nine years, height 54 inches, weight 55 pounds, anemic, who had his

A *B*

Fig. 32.—Shows a mandible too short in body. Female age 11 years. (One-fourth life size)

Fig. 33.—Dental models of Fig. 32.

A *B*

Fig. 34.—Arrest of development of the rami of the mandible. Boy 10 years old. (One-fourth life size.)

Fig. 35.—Dental models of Fig. 34.

Occasionally one is fortunate enough to have a record of an individual at various ages. I desire to show a few illustrations that bear upon this phase of the subject.

The relation of the stomion, or oral fissure, to the occlusal plane, in every type of oral deformity, is another subject which awaits investigation. This may occasionally be altered during treatment, but only to a very slight extent when treatment is undertaken early. In unilateral distoclusions the median line deviations, resulting from arch malrelations being limited to one side, are very noticeable. In the younger patients these readily yield to treatment.

The forward and downward voluntary movement of the mandible, to such an extent that the arch relationship and the facial form approaches the normal, may frequently be requested during first consultations as an aid in diagnosis.

Fig. 38. Neutroclusion complicated by mesioversion of 7.6,5,4/4,5,6,7.

A *B*
Fig. 39.—Facial form of case in Fig. 38. (One-fourth life size.)

In conclusion, the writer wishes to emphasize the very great value of standardized, life-size, photographic records. They constitute a most helpful diagnostic aid, and when studied in connection with the plaster models and anthropometric measurements of the facial features, and then reviewed in the presence of the patient, a more adequate and reliable basis for a diagnosis is thus established. An isolated consideration of the occlusal relations of the teeth, as recorded in a plaster model, does not constitute a complete diagnosis. Valuable and necessary as such a study is, it is only one phase of the problem. And cases like the above have convinced the writer that the claim of C. S. Case, namely, that the facial form is frequently a safer guide than the occlusal relations of the teeth, is a step in the right direction.

The acceptance of this view implies a standardization of accurate methods of measurement, applicable to the facial features that are involved in these deformities. The writer does not regard this as an impossibility, but "a consummation devoutly to be wished." Indeed, far more intricate problems than are here involved have frequently been solved by the mind of man. My own investigations during the last five years continually persuade me to this view, but the bounds of this communication far exceed reasonable limits and therefore forbid my dwelling upon it at this time.

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- ¹⁸Zsigmondy: Festschrift, Vereines Oestr. Zahnärzte, Vienna, 1911.

DISCUSSION

Dr. M. T. Watson, Detroit.—Dr. Lischer in speaking of the parents a number of times referred to the fact that their occlusion is normal. I would like to ask him whether he was referring to the mesiodistal relation?

Dr. Lischer.—Yes. There is no similar deformity as in a child.

Dr. Milo Hellman, New York City.—I want to correct certain statements that were made as not harmonizing with my own experience. The paper was read too rapidly for me to grasp everything that was in it.

In the paper I shall read tomorrow I shall deal with a number of the same problems from a different angle. There are several statements made in Dr. Lischer's paper which seem in opposition to some of my findings.

Dr. Lischer stated that individuals living under different economic conditions show certain differences in the eruption of teeth. He mentioned the fact that in the well-to-do they are accelerated, that is, the teeth of the well-to-do erupt earlier, while in the poorer class the teeth erupt later. Am I correct?

Dr. Lischer.—What I said in regard to that was a quotation from anthropologists who examined 50,000 individuals.

Dr. Hellman (resuming).—That is where I find certain differences in my findings. For instance, in a number of individuals examined among the poor and wealthy we found the same things regarding the stature and weight. In the well-to-do individuals, who live under more favorable circumstances, we found the teeth were better cared for; at the same time, they present a higher percentage of occlusion. Furthermore, we found that their teeth did not erupt earlier, but rather later than the teeth of the poorer classes. The poorer classes are less developed, smaller in stature, yet they show acceleration in the eruption of the teeth. This acceleration in the eruption of the teeth is very significant, which means that a loss in the permanent deciduous teeth may be due to lack of dental care. When a tooth is lost

through lack of care the permanent teeth will follow more quickly. On the other hand, the better developed individuals show retrusion with reference to the teeth because they are better taken care of in infancy. Their deciduous teeth are kept longer, and they erupt the permanent teeth later. These observations are made from a large series of individuals (I do not remember exactly the number); however, this is a very accurate estimate because these investigations were conducted on the same racial individuals, but whose economic conditions were different.

Another very interesting point is the statement of these anthropologists saying that the incisors of the female are larger than those in the male. That is right, and it has been verified fairly well, but they do not take occlusion into consideration at all. They do take the size of the incisors into consideration with the size of the other measurements of the head. Whether a tooth is in malocclusion or not, makes very little difference, but the actual size is larger, and it may not be larger than the male incisor, but it is larger in proportion to the other measurements of the head. The head of the female is smaller than that of the male, therefore the proportion is different. So that is correct.

Another thing I wish to speak about is the slide shown by Dr. Lischer by Sigmundy. He showed a certain anatomic point taken with reference to the development of the dental arch. That is very misleading. The anatomic point is taken very accurately, but at the same time it is taken of different individuals of different ages and of different races, and we may have a discrepancy in the type of arch as well as the type of head and type of teeth, so that we have to take all these things into consideration if we want to come to a definite conclusion.

Dr. Edward A. Bogue, New York City.—I am very glad indeed to have had the opportunity of listening to this splendid paper by Dr. Lischer. I wish to thank him from the bottom of my heart for the careful investigations he has made before presenting this subject to us. He has been making investigations among grown up patients, while I have been working in my little corner very largely with little folks around me. I have been only working with babies, you might say, while he has been working with grown ups. Tomorrow I am going to show some pictures of what I have accomplished. In showing these pictures I shall probably be thinking of Dr. Lischer and his work all the time. He has found things as they really are. He has given us truthful representations of what happens, without the intervention of the orthodontist. I shall hope to show you tomorrow what may come when orthodontists have an intelligent comprehension of what we have to do, and do it at the proper time. I thank you.

Dr. B. E. Lischer, (closing).—I want to thank you for your patience in listening to my long paper. The remarks of Dr. Hellman in regard to the greater width of incisors in females I accept, but the point I made about the slide taken from a famous text on anthropology is still well taken, namely, the case exhibited a typical dento-facial deformity with marked labioversion of the maxillary incisors, and the prominence of the lips and mouth was due to that and not to the width of the incisors.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

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It is the object of this department to publish each month original articles on dental and oral radiography. The editors earnestly request the cooperation of the profession and will gladly consider for publication papers on this subject of interest to the dental profession. Articles with illustrations especially solicited.

ORAL ROENTGENOLOGY

BY COLLINS A. LE MASTER, D.D.S., ST. LOUIS

Professor of Roentgenology at the St. Louis University, Dental Department

ROENTGENOLOGY is a most important means of diagnosis and offers a great aid in the treatment of most diseases of the mouth. This is well known to the modern dental surgeon and no one who has the welfare of his patient at heart, as well as his own for that matter, can practice dentistry without its aid. In regard to the welfare of the patient, let us stop and consider his side of the matter; when he places himself in our hands for dental advice and services, he puts himself, as it were, at our mercy. We are trusted implicitly and it is up to us to give him expert guidance and service. Now we know that the history given us of his case is sometimes misleading, but it is nevertheless an intricate part of our examination. Are we so expert as to feel that with our instrumental examination, digital examination, and history of the case, we are able to determine everything abnormal in the patient's mouth? We must seek other assistance; and the roentgen ray, while not absolutely perfect, is of known value; it certainly adds a great deal to the final diagnosis of the case and acts as a final check on our other findings. All of these, together with the bacteriological test, give our patients as thorough and conscientious a service as is possible with our present knowledge.

Let us now consider the dental surgeon's side. Recall the many men in our profession who have given us valuable ideas both from a diagnostic and mechanical standpoint since the use of the roentgen ray. It has stimulated research work in our profession by showing us things we have never known before; it has opened new and untrodden fields to us; and it acts as a guide to good dental service and advice. True, it shows up the defects in our work, which we as humans dislike to see, but one never reaches his ideal without being shown his faults. This stimulates us to do better work and shows us the results we are getting, which is the thing we all hope to do, obtain results.

The subject chosen for this article is very broad, but I will endeavor to cover as much of the field as will be possible, laying special emphasis on the interpretation of the roentgenogram, with a few practical ideas as to the technic.

To properly interpret the roentgenogram, a thorough knowledge of the roentgen ray, as well as the anatomy of the part to be examined, together with the various problems of dentistry, must be known. Let us remember that the roentgenogram does not record diseases, but only the variation in the density of the various structures and tissues.

It is well to consider the appearance of normal conditions with special

Fig. 1.—Maxillary centrals and laterals on one roentgenogram. Are the areas of involvement surrounding the apices of the roots advanced or are they superimposed shadows?

Fig. 2 —Right maxillary central and lateral incisors, roentgenogram shows no superimposed shadows, the areas of destruction can be clearly outlined.

Fig. 3.—Shows antrum shadows superior to root of the bicuspid and molar also to the first bicuspid area.

Fig. 4 —Shadows of the antrum over the end of the roots of the molars. Note the granular area on the apex of the mesio-buccal root.

emphasis on normal conditions which are mistaken for abnormal ones. The two jaws, maxilla and mandible, are very dissimilar in their makeup and appearance on the roentgenogram. The upper jaw, maxilla, is very porous in its structure and has definite landmarks; such as the maxillary sinus (antrum), zygomatic arch, the maxillary tuberosity, and posterior to this with the direct angle radiogram, is seen the pterygoid lamina. This is normally seen when the angle of the central ray is at a right angle to the teeth. The mandible, lower jaw, is a very compact bone in its structure and shows as very regular in makeup and of fairly uniform density on the roentgenogram. The mental

foramen opposite the lower bicuspid and the inferior dental canal are also some of the landmarks.

A few words as to normal conditions which are often misinterpreted as abnormal: In the maxilla, in the central and lateral incisor regions, radiolucent, black areas are sometimes seen over the apices of the roots suggestive of an involvement of the process, which may be the shadows of the nasal openings or the anterior palatine foramen. These must not be mistaken for pathologic conditions and must be kept in mind. The method of avoiding these shadows is to make two roentgenograms, one to include the right central and lateral incisor and one for the left central and lateral incisors, tipping the tube acutely towards the median line in both instances, and these shadows will be thrown off the film entirely, the centrals and laterals showing without any superimposition of shadows. (Figs. 1 and 2.)

Fig. 5.—Maxillary molars with the zygomatic arch superimposed over roots.

Fig. 6.—Maxillary molars showing the roots of the molars clear in outline; note granuloma area on lingual root with absorption of the apex.

Fig. 7.—Maxillary molar with zygomatic arch superimposed over roots.

Fig. 8.—Same case as in Fig. 7, with modified technic showing granulomas on roots. Patient had very heavy zygomatic arch.

The bicuspid and molars on either side, the antrum shadows which appear black on the roentgenogram may be mistaken for an area of destruction of the process; this appears at all times over the molar roots but only at times over the bicuspid roots, due to the angle from which the roentgenogram was taken (Figs. 3 and 4). The zygomatic arch (process) which usually appears as a dense white shadow over the apices of the upper molar roots, usually obliterates the roots and the periapical regions and makes proper interpretation of the roentgenogram practically impossible. To avoid this shadow and also to help overcome the superimposition of the antrum shadow I will refer the reader to my article "A Modification of Technic for Radiographing Upper Molars," in the *Journal of the National Dental Association*, April, 1921, viii,

No. 4, pp. 328 and 329; the *Journal of Radiology*, Department on Technic, June, 1921, ii, No. 5; also the *American Journal of Roentgenology*, November, 1921. (Figs. 5, 6, 7 and 8.)

The coronoid process of the mandible occasionally appears in the neighborhood of the maxillary third molar region due to superimposition, which might be mistaken for the roots of the maxillary third molar or an unerupted third molar. It is a white dense shadow and can usually be determined by its shape. (Fig. 9.)

The Mandible.—In the bicuspid region we have the mental foramen which may be superimposed over the apices of the roots of either bicuspid. It appears on the roentgenogram as a black area suggestive of a granuloma. This must be borne in mind and when such a condition presents itself a check-up roentgenogram should be made at an exaggerated angle, mesially or distally, to see whether the area again appears in the same position as on the previous one. If it appears in the same position, it may be interpreted as

Fig. 9.—Maxillary molar showing the coronoid process posterior to third molar also the pterygoid lamina.

Fig. 10.—Shows the mental foramen opposite apex of mandibular second bicuspid.

Fig. 11.—Showing the mental canal inferior to the apices of the first and second bicuspids.

Fig. 12.—Showing the mental canal inferior to the apices of the mandibular bicuspid and molars.

an area of destruction; if it has moved from the end of the root, mental foramen. The vitality test should always be made as a check on these conditions. (Fig. 10.)

The inferior dental canal running beneath the apices of the bicuspid and molars is very often misinterpreted for areas of destruction of the process, fistulous tracts, and granulomatous areas. These conditions are difficult to rule out and various methods are employed. If searching for a fistulous tract in the neighborhood of an infected tooth, attempt the injection of Beck's paste and make another roentgenogram. The paste will appear as a very white shadow easily discerned, and if there is a fistulous tract, it will follow the tract. Stereorontgenograms are also very valuable in determining these conditions. (Figs. 11 and 12.)

In taking an extraoral roentgenogram, with the plate on the outside of the cheek for the mandibular third molar area, we may have black shadows in the region of the mandibular third molar and posterior to the third molar region in the angle of the mandible itself suggestive of an extensive involvement of the bone. This may be superimposed shadows of the neck, esophagus, etc. Operations have frequently been performed on mandibles that have been found to be normal after the diagnosis of advanced bone involvement. This is a serious mistake but nevertheless often made. (Fig. 13.)

Let it also be remembered that a child's permanent tooth when erupting

Fig. 13.—Showing the area of the mandible posterior to the third molar. Radiolucent area is the superimposed shadows of the neck.

leaves an open space in the process by its path of eruption and often when the teeth are fully erupted we find a radiolucent area surrounding the apex of the root; this is frequently found also when third molars have just erupted. These conditions may be misinterpreted for granulomatous areas; they can be explained by the fact that the path formed by the erupting tooth has not fully regenerated, and then, too, the roots may not be fully formed. If checked up with another roentgenogram at a later date it will be noted that the root apex is completely formed and that the process surrounding the apex has developed into a normal appearing tissue (Fig. 14).

The above are some of the conditions which are often misinterpreted and it is absolutely necessary that one bear these in mind when interpreting a roentgenogram.

In discussing the pathologic conditions of the teeth with reference to the interpretation of the roentgenogram I will partly follow Thoma's Oral Roentgenology, for in his book we find a very complete outline and one which practically covers the entire field.

1. THE IRREGULAR ERUPTION OF THE TEETH

A. Misplaced Teeth may be found in any part of the maxilla and mandible and it is always important to include in the roentgenogram all places where they could be located. For this reason it is usually advisable to take an extraoral roentgenogram so as to include such places as the nasal cavity, the maxillary sinus, and the lower border and ramus of the mandible. These

Fig. 14.—Showing child's teeth erupting, leaving radiolucent areas at the apices of the roots. Apices of roots not formed.

Fig. 15.—The occlusal bite method of localization. Shows cuspid and bicuspid to be lingual to anterior teeth. That is all. Dry specimen.

teeth often should be localized for extraction and one of the most successful means is the use of the stereoscopic method (Figs. 15, 16, 17).

B. Unerupted Teeth: Impacted Teeth.—Roentgenograms are of value in cases of unerupted and impacted teeth to determine the position of the tooth; whether it is simply an unerupted tooth or whether impacted. We find that the mandibular third molar is the tooth which most often gives us this difficulty and is the tooth most frequently found impacted. Next are the maxillary cuspids, but any tooth whether maxillary or mandibular may be found in this condition. It is always necessary to localize these teeth before either extraction or when orthodontic treatment is contemplated. It is usually very deceiving from a flat roentgenogram to tell where the tooth lies with reference to the surrounding teeth and structures. The most valuable and convincing method is the stereoroentgenogram, as it gives the operator perspective and

he can really see the position of the tooth. This method is a boon to the roentgenologist, for with it he gains results which he has failed heretofore to obtain (Figs. 16, and 17).*

C. Partially Erupted, Impacted Teeth.—The condition frequently occurs where a tooth only partially erupts and fails to advance any further. The roentgenogram often shows us what conditions are holding back this tooth, and after the obstruction is removed, the tooth continues in its path of eruption until it reaches its proper place in occlusion.



Fig. 16.—Dry specimen. Same as in Fig. 15. Localizes the cuspid with the stereoscopic method. Shows position of cuspid with relation to the surrounding teeth. This cut may be viewed through a hand stereoscope by mounting it on card board.

Fig. 17.—Showing the position of an unerupted central incisor with the stereoscopic method. Also note cuspid. Actual case.

D. Supernumerary Teeth.—Frequently supernumerary teeth are found and may be the cause of obscure neuralgia pains, and without the use of the roentgenogram the condition is very often overlooked. These teeth may be found in any part of the maxilla and mandible, and all of these areas must be included whenever the symptoms and history of the case might lead us to

*Le Master, C. A.: "Dental Stereorontgenography," *International Journal of Orthodontia and Oral Surgery*, June, 1921, vii, No. 6.

believe that such a condition exists. Again these teeth must be localized before extraction. (Figs. 15, 16, 17.)

2. DISEASES OF THE HARD TOOTH SUBSTANCE

A. Abrasion.—Abrasion is a physiologic process, the teeth having been worn down by mastication. The value of the roentgenogram here is to determine the proximity of the abraded surface to the pulp of the tooth. This is frequently valuable as a guide to diagnosis and the determining of the proper treatment procedure.

B. Fractures.—A condition often overlooked is the fractures of the teeth which occasionally occur beneath the gum margin and are not noticeable in the digital and instrumental examinations. Roentgenograms should always be made of fracture cases whether the history given be that of an old or of a recent occurrence. It is not always possible to show the fracture of a tooth on a roentgenogram. Fractures generally occur in a horizontal direction, and teeth that have posts in the canals usually fracture vertically. If the vertical fracture lies in a labiolingual plane, it can be easily demonstrated, while the distolingual cannot always be shown. I have found that by attaching a ligature to the crown of the tooth and instructing the patient to exert pulling force on the tooth while making the exposure for the roentgenogram, it is often possible to show the fracture, as thus the fragments are displaced. This is particularly true where the fracture occurs in the horizontal direction without displacement of the fragments.

C. Caries is the most common form of dental disease, and while it is, as a rule, easy to find with the instrumental examination, it often occurs in an inaccessible place, such as the proximal areas of the teeth, beneath fillings and crowns, the gingival margins, and beneath the gingiva. It appears as a black, radiolucent area on the roentgenogram. Caries must never be overlooked as it is the starting place for the loss of the tooth, and is often the cause of pains which we diagnose as imaginary on the part of the patient.

D. Odontoma.—A tumor of the teeth. An odontoma is made up of various tooth substances (tissues) one or more of which may enter into its composition. It may be attached to one tooth or may be made up of two or more teeth fused together. They are usually easily recognized and appear as large dense white areas of various shapes. The value of the roentgenogram for these cases is to determine their presence, size and proximity to surrounding structures.

E. Exostosed (Hypercementosed) Roots.—The roentgenogram is valuable for exostosed roots, especially when extraction is contemplated. We have all experienced the difficulty in extracting such teeth and have regretted the damage we have done to the surrounding teeth and tissues. Many devitalized teeth have this condition present on their roots and it will save us much difficulty if before extraction we know that such a condition exists.

F. Necrosis of the Root.—In the roentgenogram necrosis of the root is recognized by the poorly defined outline of the apex and in the later stages by actual loss of the apex of the root. The roentgenogram is valuable from a

diagnostic point of view from the fact that these conditions may be found in their early stages and if advanced they surely would not offer a firm anchorage for a bridge or canal post.

G. Pulp Stones.—We might classify pulp stones as a disease of the hard tooth substance. The roentgenogram is of value in diagnosing cases of neuralgia and in cases in which the death of the pulp of the tooth has taken place without any appreciable cause. They appear on the roentgenogram as an opaque (white) shadow within the pulp chamber. It must be remembered that a shallow alloy filling or a synthetic filling with a heavy cement base might appear similar to a pulp stone if they are either on the buccal, labial or lingual surface of the teeth, due to superimposition, and should always be checked up with a careful instrumental examination.

3. DISEASES OF THE PULP AND THEIR SEQUELA

A. It is absolutely necessary for the dental surgeon when contemplating the removal of the pulp from teeth to know the size, shape, and number of root canals. We have had the experience, every one of us, of laboring over the filling of root canals until we were ready, as the pugilist says, "to throw up the sponge." The filling of root canals is at best a difficult procedure, and if the roentgenogram will simplify the operation any, surely we should make use of it. The procedure which I advocate when root canal work is to be done is as follows:

1. Have a roentgenogram made before the operation is commenced so as to get a bird's-eye view of the field of operation; namely, is there any obscure caries which might cause leakage of the devitalizing agent from the cavity into which it is sealed to another which communicates from the mouth. Is there some condition which might indicate extraction of the tooth, such as very irregular roots which are impossible to fill, and the tooth would be better out than retained with poor root canal work? Often we find large areas of destruction at the apices of these teeth; *nerve tissue is very highly resistant to destruction by bacteria and often it functions while the process in that area is destroyed and badly diseased*, necessitating the extraction of the tooth to drain the infected area. Also in molar teeth, if the process of the interradial area is involved either by a pyorrhea condition, trauma or perforation of the subpulpal wall, the tooth is seldom worth treating.

2. After nerve canals are reamed and cleaned out, place diagnostic wires in the canals to determine whether you are in the canals; how far you come to the apex of the root and whether you have punctured any part of the canals.

3. After the root canals are filled, make another roentgenogram to determine whether the work has to be done over. This last step is the essential one, for surely if we hope to do good root canal work, we must live up to this rule.

B. So-called Dead Teeth.—Can the fact that a tooth is dead be determined by the roentgenogram? The dead pulp cannot be differentiated on the roentgenogram from a live one unless it shows a condition present which might have caused its death, such as caries, pyorrhea pocket which might extend to the apex or the proximity of an unerupted tooth.

4. THE SEQUELA TO DISEASES OF THE PULP

The *Alveolar Abscess* is perhaps the most important condition we have to consider because it has opened up a field to the dentist, which before the use of the roentgenogram was not definitely known. It has made the dentist a most necessary factor in physical examinations. We have read and heard so much about focal infection and have had the experience of carrying through cases of this character in our practice that we can realize the importance of our examinations to humanity. A great burden has been put upon the dentist's shoulders and we are proud to state that he has carried it well.

A. The Granuloma.—The granuloma is usually found in the following locations. The *apical granuloma* is most commonly found in the periapical regions. It appears on the roentgenogram as a black area surrounding the apices of the roots of the teeth. Do not forget that there are many normal conditions, mentioned before, which might deceive one.

B. The Interradial Granuloma is seen directly beneath the pulp chamber. The floor of the pulp chamber may be penetrated either with a burr, reamer, or caries or inflammation may set in through a pyorrhea condition or injury, with a resulting granuloma formation.

C. The Lateral Granuloma.—Granulomas on the lateral surface of roots of teeth are usually caused by perforation of the root wall, the extremely close proximity of a post to the periphery of the root wall, and external injury. Bear in mind that such a condition is not always easily obtained on a roentgenogram especially if it is situated on the buccal lingual or labial surface of the root, as the root being a dense material will often obliterate the granuloma area.

5. DISEASES OF THE MARGINAL PART OF THE PERIDONTAL MEMBRANE

A. Marginal Periodontitis or Pus Pockets are frequently found on single teeth and are due to infection of the marginal part of the peridental membrane with involvement and destruction of the bone which forms the alveolar socket. They are caused by injury or irritation from ill-fitting crowns, overhanging filling margins, faulty proximal contact of teeth and fillings, foreign substance such as ligatures, portions of rubber dam left between the teeth, the cleaning of the interproximal areas, especially with the tooth pick, etc. These pus pockets appear on the roentgenogram as black areas.

Pyorrhea Alveolaris.—The roentgenogram is of special value in all pyorrhea cases inasmuch as it helps to differentiate the hopeless cases from those of the milder form. In fact it is the best means we have of determining the extent of destruction. The instrumental examinations are not complete, and cases we would diagnose as early and not far advanced sometimes show on the roentgenogram as well advanced. The roentgenogram is of value in differentiating such conditions as pyorrhea, lateral granulomas, and pericementitis. In cases of pericementitis, the peridental membrane which appears on the roentgenogram as a black line surrounding the root of the tooth is more thickened than normal. Results of pyorrhea treatment may be checked up by means of the roentgenogram and it is always advisable to have the patient

rayed at stated intervals, every six months to a year. These check-up roentgenograms are especially of value in cases in which granulomatous areas have been treated, to determine whether regeneration has set in or not. It usually takes from six months to a year for these granulomatous areas to show regeneration. Nothing can be told of the conditions sooner as the regeneration of the process will not show on the roentgenogram. Therefore, do not expect, as a rule, that the roentgenogram will show any difference in the condition earlier than six months.

6. DISEASES OF THE JAW

The value of the roentgenogram in determining the presence, extent, and kind of disease of the jaw is of unlimited value, and whenever disease is suspected, a roentgenogram must be made. The diseases of the jaw may be classified as follows:

A. Atrophy of the Jaws.—The value of the roentgenogram in atrophy of the jaws is to determine, if possible, the cause and extent of the condition.

B. Fractures of the Jaws.—Whenever the history given is that of a possible fracture of the jaw a roentgenogram must be made to determine the presence of the fracture, its position, extent of injury, displacement of fragments, and probably its cause, pathologic fracture. The stereoroentgenogram is always of value in these cases, as it localizes the position of the fragments.

C. Ostitis and Necrosis.—The roentgenogram often shows the extent of the bone involvement and possibly the cause for same.

D. The Dentigerous Cyst.—The roentgenogram localizes the cyst, showing structures involved, and usually the starting point of the cyst, and cause.

E. Tumors are localized on the roentgenogram and are differentiated by their difference in structural appearance and location.

7. LOCALIZATION OF FOREIGN BODIES

The roentgenogram is of special value in the localization of foreign bodies, such as broken-off needles, burrs, reamers, etc. The different methods of localization may be used, but where the foreign substance is to be localized near surrounding teeth, the stereoroentgenogram is the most practical, as the superimposition of the various teeth and structures make the angle method practically valueless while the stereoroentgenograms are not absolutely accurate, they are as a rule, enough for the average dental operation. (Fig. 18.)

8. SINUSES

The dentist may be called upon to diagnose dental conditions which are suspicious of causing an antrum (maxillary sinus) involvement, sinusitis, and he should be familiar with the difference between the antrum that appears normal and the one that appears abnormal on the roentgenogram. An antrum full of fluid, pus or growth will appear light on the roentgenogram as compared with the normal one. The normal sinus being an air space is empty and offers no resistance to the passage of the Roentgen ray thus blackening the plate or film. Therefore if the findings of the teeth are such as to be suspicious of causing antrum involvement and the history of the case points to it, the

dentist, to determine his operative procedure, should know the condition of the antrum so that he can refer the case to the nose and throat specialist and work in conjunction with him. I believe that the dentist should not treat antrum conditions unless he is working under the instructions of a nose and throat specialist. It is very often necessary to drain these conditions through the mouth and it should be the duty of the dentist to establish this opening only upon order of the specialist, then let him handle the case after the opening has been made.

The foregoing paragraphs show briefly those conditions in which the roentgenogram adds value to the dentist's diagnosis.

A few words as to the position which the dental roentgenologist, radiodontist, holds and what the general practitioner should expect of him. We all know that the roentgenogram is of value in establishing a diagnosis of

Fig. 18.—Dry specimen. Mandibular teeth buccal aspect stereoroentgenogram. Broken off hypodermic needle opposite distal root of the first molar on the buccal surface.

cases, but it is only one little part of the dentist's diagnosis. The roentgenologist only handles referred cases, and the patients are always better able to give an accurate history of their case to the man who referred them and who expects to do their dental work. This, together with his instrumental examination and his ability to better determine the needs of the patient, knowing him better with the roentgenogram and the roentgenologist's interpretation of it, enables him to arrive at a diagnosis. I therefore contend that the roentgenologist's field is not that of a diagnostician, but that his work is exclusively the making and interpreting of the roentgenogram. Every one who is specializing becomes narrow in other branches of his profession and I feel that all that should be expected of the dental roentgenologist is a good clear roentgenogram with his interpretation of it, with possibly suggestions from an x-ray viewpoint.

FALSE ANKYLOSIS DUE TO DECIDUOUS TOOTH IN SINUS

BY H. F. CHAIKEN, D.D.S., READING, PA.

A YOUNG lady school teacher, age twenty-four, came to my office about two months ago with the mouth closed, complaining of pain in temporal region.

I examined the mouth and I found an impacted third molar. With a statement full of confidence, I told the patient that there lay the trouble. I gave her conductive anesthesia and removed the tooth. She seemed to improve a little, as far as opening the mouth was concerned, but I told her that it would

Fig. 1.

take a little while for complete recovery. Two weeks later she came back with the mouth completely shut, even worse than before. I was unable to place a cement spatula between the teeth.

On a large x-ray plate, one will notice (Fig. 1) it appeared as though there were a foreign body in the sinus, resembling a tooth. Under a general

anesthetic, I opened the maxillary sinus and, after spending a considerable time in exploration, I removed the crown of a deciduous molar.

I also found a great amount of necrotic bone. After curetting and washing with a normal salt solution, I closed the sinus. Two days later the patient was able to open her mouth and the pain disappeared.

What I cannot understand is how the deciduous tooth got into the sinus. The patient gives a history of having had the second premolar extracted about two years ago.

A STUDY IN THE MANAGEMENT OF TOOTH MOVEMENT WITHOUT APPLIANCES

BY R. C. WILLETT, D.M.D., PEORIA, ILL.

ELIZABETH F., aged ten years, nine months. The maxillary central and lateral incisors were reported to have erupted in normal alignment, but had recently assumed the fan-shaped position shown in Fig. 1. There was a mottled condition of the enamel of the permanent teeth, and what appeared to be a prolonged retention of the remaining deciduous teeth. The mouth and teeth had the appearance of excellent care. The radiograms were made to determine the cause of the undesirable migration of the lateral incisors.

From the radiograms as exhibited in Fig. 1 we assumed that the malposition of the lateral incisors as presented was due to the course of eruption of the permanent canine teeth. The deciduous canines were extracted, and, while they appeared in the radiograms to have little or no attachment, we found them firmly fixed.

On April 29, 1921, four months and eleven days from the date of the first visit, the case was re-examined and radiograms were made as shown in Fig. 2. At this time there was a noticeable improvement in the position of the lateral incisors.

On July 30, 1921, the case was again examined, and it was considered best to apply the theory and practice of Dr. Charles R. Baker (*The Exchange of Deciduous Teeth for Permanent Teeth*), so the remaining deciduous teeth in both arches were extracted.

The radiograms in Fig. 3 show the normal eruption of the right cuspid and an improvement in the course of eruption of the left canine. Allowing for the approximal space existing between the premolar teeth of the left side, we have reason to believe that with the distal migration of the first premolar, the canine will have ample space in which to assume equally as good a position as the corresponding member on the right side. If mechanical force had been

applied through the use of appliances in the treatment of this case in an effort to re-establish the normal position of the lateral incisors, it would have resulted in nothing more or less than a malposition in the later eruption of the permanent canine teeth. This also illustrates the necessity of carefully checking up

DECEMBER 18, 1920.

Fig. 1.

DECEMBER 18, 1920.

Fig. 2.

DECEMBER 18, 1920.

Fig. 3.

the movements of the unerupted permanent teeth by a frequent use of the radiogram to determine whether or not dentition is following the normal course of development.

PATENTS

ORTHODONTIC IMPLEMENT, PATENTED JULY 13, 1920*

MY invention relates particularly to that class of devices that are adapted to facilitate the placing or adjustment of tooth-positioning devices, and is particularly directed to implements employed in the manipulation of anchor-bands.

The principal objects of my invention are to provide an implement by which the anchor-band or other tooth-engaging means may be rotatably adjusted upon the tooth, and may be forced to conform thereto, and be held in proper position while being clamped to the tooth.

Other objects of my invention are to provide an implement arranged to adjust anchor-bands to natural teeth, and having members so correlated as to afford free access to the clamping mechanism of the anchor-band, and so formed as to afford freedom of movement without interference with the other teeth in the patient's mouth.

Specifically stated, the form of my invention as hereinafter described, comprehends an implement of the class described, in the form of a pair of pliers having one beak thereof arranged to engage the exterior wall of an anchor-band, and the other beak extended laterally and terminating in a claw, which is arranged to engage the free end portion of the threaded shank of said anchor-band within the dental arch, for the purpose of rotating or twisting said anchor-band into proper position upon the anchor tooth, said beaks being movable toward and from each other for the purpose of pinching the anchor-band around the anchor tooth to conform it thereto.

My invention also includes all of the various novel features of construction and arrangement as hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is a perspective view of a dental implement constructed in accordance with my invention; Fig. 2 is a plan view of the lower dental arch, having an orthodontic appliance attached thereto and showing the dental implement, illustrated in Fig. 1, applied to the terminal anchor-band and holding it in proper position to be clamped. Fig. 3 is a side elevational view of the implement shown in Figs. 1 and 2; and Fig. 4 is a front elevational view of said implement.

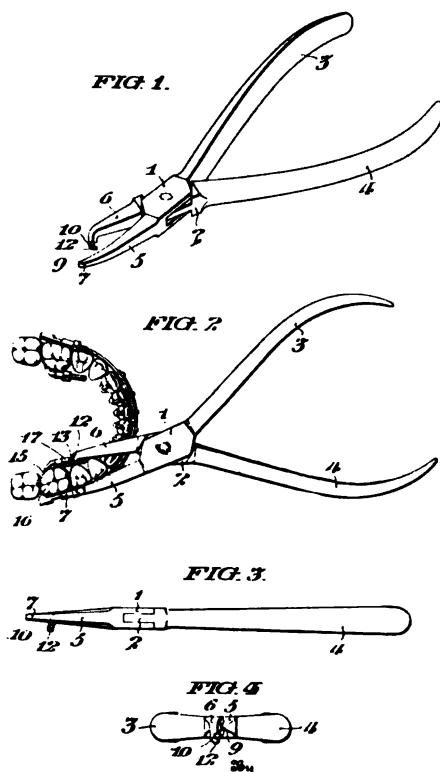
In said figures, the anchor-band placing or adjusting implement comprises a pair of pliers having the pivoted members 1 and 2 provided with handles 3 and 4 and beaks 5 and 6, respectively. The beak 5 has its free end 7 slightly curved inwardly toward the beak 6, and its inner surface slightly concaved by providing it with the longitudinal groove 9, as best shown in Figs. 1 and 4. The beak 6 has its free end bent laterally in outwardly inclined relation to the

*Patent No. 1,346,584, United States Patent Office.

plane of oscillation of the pivoted members 1 and 2, and its inner surface adjacent to said free end provided with the slot 10 extending transversely thereof to form the claw 12.

As best shown in Fig. 2, the claw 12 is arranged to grasp the free end portion of the threaded shank 13 of the anchor-band 15, and hold it as close as possible to the inner line of the teeth of the dental arch while it is being clamped to the anchor tooth 16 by rotating the nut 17 on said threaded shank 13 in a manner well known to the profession.

It will be readily seen that by engaging the beak 5 with the exterior wall of the anchor-band 15 and engaging the threaded shank 13 by the claw 12 of the beak 6, which may extend across the dental arch as shown in Fig. 2, the anchor-



No. 1,346,584

band may be pinched tightly around the anchor tooth 16 by squeezing the handles 3 and 4 toward each other, and at the same time said anchor-band may be rotatably twisted upon the anchor tooth 16 for adjusting it in its proper relation thereon.

It may be here noted that an implement constructed in accordance with my invention may be advantageously employed to direct the free end of the threaded shank of the anchor-band towards the teeth while being clamped to the anchor tooth, so as not to interfere with the tongue of the patient.

I do not desire to limit my invention to the precise details of construction and arrangement as herein set forth, as it is obvious that various modifications

may be made therein without departing from the essential features of my invention as defined in the appended claims.

Having thus described my invention, I claim:

1. An implement of the class described, comprising pivoted members movable toward and from each other, and arranged to embrace a tooth-band, one member being arranged to engage the bend and the other being arranged to engage the threaded shank thereof.
2. An implement of the class described, comprising a pair of pliers having opposed beaks, one of which is bent laterally to form a claw.
3. An implement of the class described comprising a pair of pliers having opposed beaks, one of which is curved inwardly and the other bent laterally to form a claw.
4. An implement of the class described comprising a pair of pliers having opposed beaks, one having a concaved inner surface and the other having a transverse groove to provide a claw.
5. An implement of the class described, comprising a pair of pliers having opposed beaks, one of which is curved inwardly and provided with a concaved inner surface, and the other being extended laterally oblique to the plane of oscillation of said beaks, and provided with a groove adjacent to its free end forming a claw.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Present Status of Education in Orthodontia. F. B. Noyes (Chicago).
The Dental Cosmos. October, 1921, lxiii, 10.

The author mentions orthodontia as part of the undergraduate curriculum and as a specialty of dental practice. Thus far instruction in this subject of teaching orthodontia has no status at all. Any one with a legal right to practice dentistry can practice it. There are no special colleges to teach orthodontia and confer degrees, any more than there are special colleges for teaching ophthalmology or any other medical specialty. The ordinary medical practitioner has a perfect legal status as an operating surgeon if he chooses to assume it.

Our orthodontists are of one of four sources: ordinary graduates in dentistry, with or without experience in dental practice; men who have taken short commercial courses in orthodontia; those who have worked up some knowledge of the subject in dental infirmaries, and finally those who have studied under an expert in the old relationship of preceptor and pupil.

In regard to the undergraduate dental college it has not been of much service in teaching orthodontia as part of the curriculum. The evolution of this branch has been outside the college walls. The curriculum is already overcrowded, and instead of giving more and more time to the higher developments of dentistry it will be necessary to take the opposite course in giving more and more time to the fundamentals, including the principles which underlie orthodontia.

Thus the student of the future will study occlusion as the basis of orthodontia, including the Angle conception. Before practicing he must learn things which cannot be taught to the undergraduate in his regular curriculum.

The special course in orthodontia should not be elective for those who are to specialize in it, but all undergraduates should take it before receiving their diplomas. But the dental school, despite this instruction in principles and technics, cannot turn out finished orthodontists, any more than the medical school turns out skilled ophthalmologists. The author advocates thirty-two lectures on the principles and sixteen hours additional in technical instruction of orthodontia.

In regard to postgraduate teaching, the author looks forward as in a dream to a special orthodontic college. The so-called courses for graduates teach nothing beyond what is in the undergraduate curriculum. There should be at least a solid year of special instruction, corresponding to an internate of a medical graduate in a hospital. The last four months should be exclusively clinical, while in advance of this there should be didactic and laboratory instruction. From this school the future orthodontist should pass to the dental infirmary. The balance of instruction must come from his own office practice.

The Difficulties and Complications of Dentition and Their Management. J. D. Leebron (Philadelphia). *The American Physician*, August, 1921, xxvi, 8.

The author, who is a pediatricist, first gives a résumé of primary and secondary dentition. He has often seen irregularities in the appearance of the temporary teeth in healthy children, including precocious and retarded dentition, the range being three to fifteen months for the first eruption. Breast feeding was not a factor. Usually, however, we associate constant irregularity with one of several diseases—rickets, marasmus, scurvy and inherited syphilis. In a case of teeth present at birth, one which was extracted proved to be no tooth at all, having neither root nor enamel. It is sometimes wise to extract these formations because they are both abnormal and interfere with nursing. One could hardly make a rule to this effect, however, because nursing is not always interfered with and these precocious teeth may at times be normal.

In regard to diet it may be stated in a general way that a one-sided diet, too little mineral or too little animal food, will surely manifest itself on the quality of the teeth. Not only will they disintegrate early but complications may arise. The author claims the existence of a causal relationship between maternal renal disease during gestation and abnormal dentition in the child. Of the so-called complications of dentition the author recognizes stomatitis, diarrhea, gastritis, convulsions, cough, otitis media, dysphagia, dysphonia and iritis, the last four being unusual. By far the most important is convulsions. The mechanism in the author's experience is a reflex, although the immediate cessation which has followed lumbar puncture suggests that some other factor may be present. This resource may be used when death is threatened.

The author's management of primary dentition is as follows: A cold alkaline mouth wash is usually well borne, as a teaspoonful of bicarbonate of soda in a tumbler of water. The best local application to the gums consists of potassium bromide, grains xx; chloral hydrate, grains x; tincture of aconite root, minims x; spirits of chloroform a drachm, and enough mucilage to make an ounce. This may be rubbed on frequently. The infant may bite on an ivory ring and the gums may be lanced. The bowels may be kept open by mineral oil, one teaspoonful two or three times daily. One or two grains each of extractum pancreatis, taka-diastase and sodium bicarbonate should be given combined if gastric disorders appear. Nervousness should be combated with strontium bromide and if convulsions supervene inhalation of chloroform should be added. Another resource, especially in refractory cases, is

high colonic irrigation with an enema containing sodium bromide, grains v, with one grain of chloral. Still another anticonvulsive is a hot mustard bath. Finally if all else fail lumbar puncture should be practiced.

Local Anesthesia in Dental, Oral, Nose and Throat Surgery. H. E. Tompkins (New York). *New York Medical Journal*, Oct. 12, 1921, cxiv, 8.

The sole analgesic considered by the author in this paper is procaine. which word is the American name for the German product novocaine. Natural suparenal extract is invariably added to solutions of procaine, the optimum being 1 part to 40000-50000. In order to discount the nervousness and apprehensiveness of the patient the author makes a rule to give bromides or an opiate half or quarter of an hour before operation—30 grains of triple bromides, 5 to 10 grains of bromural or a quarter grain of morphine, the latter a quarter hour before intervention. The technics of preparing the solution are elaborate. It is best to employ sterile Ringer's solution as the solvent. This is extemporized for each anesthesia. Only distilled water is used and this is boiled and the Ringer tablet added. The solution is again boiled, and when thus prepared may be suitable to use for about a week when spore formation will begin, but apparently he does not recommend this conservation. Thus far we have only the Ringer solution. The procaine and suparenine are now added separately and after addition of the former the solution is boiled a third time. These consecutive boilings are not primarily in the interest of sterilization alone but to assist in dissolving the chemicals. The suparenine is added while the solution is still warm and the latter is allowed to cool somewhat before injection. Directions for the preparation of syringes and needles are too long to quote, and the same is true for the technics of dental analgesia and blocking the inferior dental. These are reduced to a tabulation, however, and the reader might do well to obtain a copy of the latter from the journal or perhaps the author can supply it.

Rontgenographic Findings in Toothless Mouths. Eustermann (Mayo Clinic, Rochester, Minn.). *The Dental Cosmos*, September, 1921, lxiii, 9.

During the five months ending June 1, 1921, the author has examined 289 patients with completely or partly edentulous mouths in connection with ordinary routine work. During the past 16 months he has examined 11,000 patients for dental troubles, and made the discovery that root extraction, far from eliminating a focus of infection, may in itself light up septicemia. Up to the time of extraction, there had been practically no trouble. The 289 edentulous patients were all presumably ill of some affection, the diagnosis of which had been made before examination of the teeth. The diagnoses are sometimes doubtful and the connection of the teeth with focal infection is not apparent. Only 41 of the 289 were wholly without teeth. It is not extraction *per se* that lights up the sepsis but improper extraction in which the osseous tissues are compromised. The large infected focus at the apex of a tooth is no more provocative of focal infection than the matter within the cavity of the tooth and its root. Of the 289 patients examined 201 gave negative radiograms. In 89

patients there were persistent roots and in all cases the same contained matter infectious to animals; there was therefore no necessity for examining the tissues at and about the apices of the roots.

Crises of Toothache Following Absorption of Bismuth Subnitrate Taken for Ulcer of the Stomach. J. Estoule. *La Semaine Dentaire*, October 16, 1921, iii, No. 42.

The practice of giving large doses of bismuth subnitrate for gastric ulcer is commonly regarded as harmless. As much as 1600 gms. have been given in 48 hours without any detrimental consequence. In rare cases of gingivitis and stomatitis following its use impurities have been accused, as lead and arsenic. Nevertheless a fraction of the bismuth ingested is eliminated through the saliva, so that when taken over a long time there is a possibility of buccal irritation from the bismuth itself. The author while treating a case of gastric ulcer by the Fleiner-Mathieu method gave the bismuth salt in two daily doses of 10 gms. each. These doses were given with a large glass of water and as far as possible on a fasting stomach. Even the day following the first doses the patient complained of severest toothache referred to the molars and persisting two hours. The teeth were found to be in perfect condition and there were no other symptoms, buccal or otherwise. The bismuth was not repeated until several days had elapsed, when the doses were resumed and on the following day there was another crisis of odontalgia. There had been no suspicion of the bismuth as yet and the author's original intent had been to give the drug but twice weekly. The author is entirely unable to explain why bismuth could set up these neuralgia-like paroxysms, nor can he account for the localization in the molar teeth nor the subsidence of the pain while the bismuth was still in the system. The presence of gastric ulcer may have in some way made possible the phenomenon, which seems to have been quite unique in medical literature.

Tooth Infection. Oliver T. Osborne (New Haven). *New York Medical Journal*, October 14, 1921, cxiv, 8.

The theoretical indications are very plain in tooth infection and the only debatable question is how to fill them—how to remove the infectious material. It could be done radically at a single effort under narcosis or gradually in a number of sessions with the possibility of doing more harm than good. The author would not advise conservatism save in cases where the mouth as a whole is in fair health. This means that in the early stages of pyorrhea, for example, it would be well to save the teeth. This must be before there has been much burrowing below the gum line. Putrescence in the mouth is the author's strongest argument for proceeding radically. This putrid material may be in a pocket, under a gold attachment, in a tooth canal, etc. This element does not show on a radiogram. No patient who has once sampled the odor of putridity would ever consent to retain such matter in his mouth. It may happen that this is left behind while some innocent formation which makes a shadow on the plate is removed. The dentist is often tempted to

relieve only the condition for which his aid is sought and make other necessary repairs, without taking the further responsibility of extractions, removing gold attachments, etc. In many cases to do so might be to condemn his own work. Nevertheless in these cases he is not acting for the best interests of his patients or doing as he would be done by, and he should never leave behind any of these foci of putrid matter and, as often happens, infection due to the same.

Fatal Poisoning of a Dentist with Arsenic from Filling a Tooth. A. Lichtwitz. *Zahnaerztliche Rundschau*, October 4, 1921, xxxi, 40.

At 7 P.M. on a certain day as the dentist was about to leave for a social function, he filled a cavity in a molar tooth with arsenical paste to relieve toothache. The pain was relieved and the dentist left without giving the matter another thought. He ate, drank and enjoyed himself. At 2 A.M. he experienced nausea and left for home. Incidentally he found that the arsenic paste was no longer in the cavity; doubtless it had come away while chewing and had been swallowed. He had vomiting and diarrhea during the night and in the morning was unable to rise. In the afternoon he was found in collapse and also in great abdominal pain. His mind was clear and he made the diagnosis for the attending physician. During the night the picture of arsenical poisoning was fully developed. Patient presented anuria, violent pains in the calves, great thirst and a remarkable agreement with the syndrome of Asiatic cholera. He had of course been removed to the hospital where everything was done to overcome the collapse and remove the poison from the organism. He lived nearly four days after the accident. There is no mention of an autopsy. An attempt was made to determine the fatal dose of the arsenic in the paste which had been swallowed in association with two other ingredients, cocaine and carbolic acid. The entire mass was the size of a pea. The arsenic was estimated at $115/1000$ of a gram, equal to about 1.7 grains—about 23 times the safe limit. The amount of cocaine was twice that sanctioned by authorities and only the carbolic acid had been present in the proper quantity. The mass of the paste used by the deceased should not have exceeded that of the head of a common pin. Some use only half this quantity.

Pulpless and Vital Teeth. Their Relation to Disease. By H. C. Moxham (Sydney). *The Medical Journal of Australia*, August 27, 1921, viii, 9.

The author begins by alluding to the manner in which the American dental profession became obsessed some years ago as to the menace of dental focal infection. From 1917 to 1919 there was an era of indiscriminate extraction which has somewhat abated. In a large percentage of cases extraction did not benefit the alleged system infection. In another fraction it is by no means certain that benefit was due to removal of a dental focus of disease. In other cases there could be no reasonable doubt that removal of a pulpless tooth had caused a notable and rapid cure.

The author lays down rules for the selection of pulpless teeth, the removal of which would probably cure the patient of some malady. Untreated

pulpless teeth should, of course, be treated and if they do not respond an x-ray should be taken and if a granuloma is undoubtedly present the tooth should come out, although sometimes an apicectomy answers. In regard to filled teeth the x-ray is untrustworthy as to the completeness of root fillings unless some special material is used for the purpose of becoming radiographically visible, as bismuth oxychloride. It is impossible to judge without x-raying but interpretation is often difficult and erroneous and the patient will not go to the expense. But at least 80 per cent of modern filling is both clinically and radiographically correct so that doubtful cases are in the minority.

Fatal Case of Buccal Gangrene Following an Extraction. Kritschewsky and Seguin (Paris). *Revue de Stomatologie*, August, 1921, xxiii, 8.

This case is not only of great interest *per se* but raises the question of the identity of the case with noma. The patient was a man of 45, referred by the dentist consulted to the authors as a case beyond his practice. He was seized with symptoms of gingivitis and loosened teeth and in addition there appeared a swelling of the lips and cheek. The character of the pain suggested a pulpitis. The dentist in question pulled an incisor but the symptoms deterred him from any wholesale extraction. The condition originally present was aggravated and the dentist referred the subject to the Stomatological Department.

The status of the patient indicated severe infection of the buccal cavity terminating in gangrene of the soft parts with regional adenopathy. The clinical history, while inconclusive, was questionable. There was a past of alcoholism, of a dozen of small potations in the forenoon, etc. The authors would have made injections of salvarsan had the subject been more robust; instead they were limited to mouth-washes. After considerable delay a root was extracted and this seemed to aggravate the condition. A surgeon was summoned but he would not intervene and death occurred a fortnight after the first onset of the disease. The microscopist found an abundance of spirochetes and some fusiform bacilli, so that from this angle the case was a Vincent gingivitis; but the clinical diagnosis was noma, although the necrosis seems to have been limited to the right upper gum.

Study of Dental Caries. Stanley Colyer. *The Dental Record*. October 1, 1921, xli, 10.

There is agreement among authorities on at least one point in the causation of caries, to wit, that it is due in some way to food. It is not entirely true that primitive and ancient people are always immune, for while this applies to many races some like the ancient Bushmen suffered from it and more than do the most civilized African races. This is shown by examination of skulls. But in these researches ordinary enamel caries is understood, and no account is taken of caries of the cementum or caries of the crown which follows certain injuries; for naked dentine when exposed readily decays. Again slow destruction of roots is not the same thing as ordinary caries. From his experience with African natives the author can state that the immunity of savage tribes

to ordinary caries is soon lost, when they begin to live like Europeans. This immunity depends on the condition of the enamel, hence some alteration evidently takes place in that structure. The author believes that the state of the saliva plays little part in the etiology of caries, while familiar with Pickerell's claim that there are at least eight ways in which this fluid can contribute to the condition in question.

The author discusses the relationship between food and caries. The original way of softening food for the table was by allowing it to rot, which was succeeded in time by cookery. This latter was doubtless a powerful modifier of the functions of the intestinal tract which was originally geared for hard food save when fruits, flesh, etc., were obtainable. Milling obtained starchy substances and eliminated some of the indigestible residue and a few articles like sugar were obtained by extraction. Food comprises fresh and dried staple articles and opportune materials, the latter being used chiefly among nomadic races.

Food is the ultimate cause of caries but the mechanism continues obscure. The next obvious factor is the presence of enzymes thought to be of bacterial origin which are acid-formers. But in almost all tropical countries the primitive inhabitants use much sour milk, etc., which is of similar origin, yet causes no caries by reason of some immunity of the enamel. In man the presence of easily fermentable carbohydrates is thought to be an important factor. The theory of "soft food" as a cause evidently is the same as the "absence of use" theory, and the author barely mentions it. It is probable that the immune subject is one whose mouth is free from fermentable carbohydrate, whether from the character of the food, the habit of eating, the care of the teeth, etc., so that immunity is to a certain extent accidental and hence may occur alike in the primitive and highly civilized.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

Meeting of the American Society of Orthodontists

The next meeting of the American Society of Orthodontists will be held in Chicago, Illinois, at the Edgewater Beach Hotel on April 24, 25 and 26, 1922. A very interesting and instructive program has been arranged by the Board of Censors, consisting of Clinics, Case Reports and Papers of unusual merit. Reservation should be made early in order to secure the best accommodations.—Ralph Waldron, Sec.-Treas.

Meeting of Kentucky State Dental Association

The next annual meeting of the Kentucky State Dental Association will be held in Louisville, Kentucky, April 10, 11, 12, 1922, Seelbach Hotel as Headquarters. A clinical program of unusual interest is being arranged. Address all correspondence to W. M. Randall, Secretary, Louisville, Ky.

The American Society of Dental Radiographers

The American Society of Dental Radiographers will meet at Drake Hotel, Chicago, Illinois, on January 18th, 1922. A scientific program of unusual interest has been prepared, besides the transaction of important business matters. All interested in Dental Radiography are invited to attend. H. C. McKittrick, Pres., I. O. O. F. Bldg., Indianapolis, Ind. Martin Dewey, Sec.-Treas., 501 Fifth Ave., New York, N. Y.

American Institute of Dental Teachers

The Twenty-Ninth Annual Meeting of the American Institute of Dental Teachers will be held at the Windsor Hotel, Montreal, Quebec, on January 23, 24, 25, 1922.

An interesting program has been arranged, built around the theme of Preventive Dentistry and its correlated subjects: What, When, How and Why to teach. There will also be a complete exhibit of scientific teaching apparatus, college equipment, etc.

All interested in dental teaching are cordially invited to attend. Guy S. Millberry, President. Abram Hoffman, Secretary-Treasurer. 381 Linwood Ave., Buffalo, N. Y.

New York Society of Orthodontists

The organization meeting of the New York Society of Orthodontists was held at the Academy of Medicine, October 20. The following officers were elected: Dr. J. Lowe Young, New York City, President. Dr. Herbert A. Pullen, Buffalo, N. Y., Vice-President. Dr. William C. Fisher, New York City, Sec'y-Treas.

Dr. Young then appointed a committee to adopt a Constitution and By-laws, making Dr. Leuman M. Waugh, of New York City, chairman of that committee. The president also appointed a committee on arrangement to provide for the next meeting. Doctor Joseph D. Eby, of New York City, was named chairman of the arrangement committee.

The first regular meeting of the New York Society of Orthodontists will be held at the Hotel Vanderbilt on Thursday, December 8. The program consists of a business session in the afternoon, at which time a report of the committee on Constitution and By-laws will be received and acted upon. The evening session consists of a dinner, followed by three twenty minute addresses, "Ideals and Orthodontia," by Dr. Milo Hellman, "Looking Both Ways After Twenty Years," by Dr. Martin Dewey, and "The Outlook," by Dr. Leuman M. Waugh.—President, J. Lowe Young, 8 West 74th Street, New York City. Secretary-Treasurer, William C. Fisher, 501 Fifth Avenue, New York City.

Notes of Interest

Dr. Hamilton D. Harper announces the opening of his offices, Suite 501-3 Hutchinson Bldg., Shreveport, La. Practice limited to orthodontia.

Dr. Winston P. Caine announces the opening of his offices, Suite 623-5 Volunteer Bldg., Chattanooga, Tennessee, for the practice of orthodontia.

Mr. Harold Chapman begs to announce that on and after November 1, 1921, he will practice orthodontia exclusively. 15 Upper Wimpole Street, London, W. 1.

Dr. Joseph D. Eby, formerly associated in practice with Dr. V. H. Jackson, now announces his location, 54 E. 62nd St., New York City, N. Y. Practice limited to orthodontia.

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¹Billings, J. S.: Our Medical Literature, Trans. VII Intern. Med. Congress, Lond., 1881, i, 54-70.

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